

Warring Brothers

Constructing Komatsu's and Caterpillar's Globalization

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Introduction

Globalization is remaking spatial connections between different parts of the world and creating new geo-imaginaries of how it is organized. As such, it challenges the idea, dominant since Keynes's 1936 *The general theory of employment, interest and money*, that economies are nationally organized. This material re-articulation of the world economy and discursive shift from seeing it as a set of interlinked, nationally organized economies to an increasingly holistic, singular entity, is impacting firms, governments, and labor organizations, which must reconfigure their political praxis to address changes in how the world is organized and reimagine their places within it. In this context, much globalization talk has focused upon the power of transnational corporations (TNCs) to transform the planet. Many see TNCs as the decisive global actors shaping economic development as they move investments around the world. Through implementing in the economic landscape what Harvey (1982) has called a "spatial fix", a geographical configuration of investments allowing them to confront challenges they face at specific times, TNCs connect some workers and disconnect others via practices of "strategic coupling and decoupling" (Coe *et al.*, 2004).

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In an effort to explore how TNCs implement spatial fixes and what practices of strategic coupling and decoupling mean for labor, here we compare and contrast how Komatsu and Caterpillar, the world's two largest engineering machinery firms which are crucial suppliers to highly globalized economic sectors (mining and construction), structured their Global Production Networks (GPNs) in particular geographical ways as they grew from small, local firms to become TNCs with truly global reach. Their becoming global – that is to say, their remaking of their own spatial scales of organization – has been a central element in their accumulation strategies, one that not all firms feel is necessary for success (many firms are quite happy to remain locally or nationally focused). In exploring this spatial history, we show how addressing geographical concerns has been crucial to how the two have actively constructed their own global presence. Significantly, though, whilst tremendous rivals, in some cases they have also been strategic allies. This competitive and collaborative relationship has shaped their geographical organization.

We build our argument around three principal points. First, we suggest that firm evolution must be seen as a deeply geographical process. Both Komatsu and Caterpillar have had to be highly spatially aware and nimble. Contra arguments asserting that we live in a world in which geography and the specificities of place are becoming less important because firms can now locate almost anywhere on the planet – Ohmae (2005, pp. 13, 94), for instance, has suggested that “in the age of the global economy [it] no longer matters where a company is based” – we argue that if firms can indeed locate their operations almost anywhere, then the particularities of where they do choose to locate them – that is, local geography – become more, not less, important. Firms' ability to reorganize their own spatial configurations, then, is a central element in the accumulation process. Further, we question what it actually means to “go global”. Whereas “going global” has often been talked of as if it were an unproblematic, inexorable process, we demonstrate that it is neither predestined nor free of challenges. Instead, it involves making a series of spatially informed decisions. In particular, we show how the two firms consciously constructed new global scales of existence to address challenges they faced at various times. Such an approach sees their globalization not as some kind of inevitable end-game of capitalism, the only possible outcome of capitalist accumulation dynamics, but instead as something subject to political contestation. Firms' global organization, therefore is a social product, not an inevitability. Recognizing this is important for contemplating the politics of globalization and developing alternatives to its neoliberal version.

Second, we engage with Coe and Yeung (2015, p. 191), who argue that GPNs “are as much systems of labour as they are systems of value creation and circulation”. As they note, “the uneven availability of an ‘appropriate’ workforce – notably in terms

of the intersecting attributes of skills, productivity, cost, and controllability – across different regional economies is an important factor underpinning strategic coupling and... uncoupling and recoupling”. However, as they also note, “until recently[,] labour was a chronically neglected dimension of these systems”. The case study below, then, seeks to counter this neglect by showing how both firms’ efforts to develop geographical strategies were deeply shaped by labor concerns, both *labor as object* (how each sought to manage its workers) and *labor as subject* (how workers forced each firm to reconfigure its structures, often in ways it did not wish). Managing interactions with labor and the state are aspects of firm transnationalization and GPN administration that are often skipped over in analyses, with transnationalization frequently conceptualized simply in terms of how TNCs seek to take advantage of variations between what are perceived to be largely passive states and workforces in different places. In contrast, our spatial history highlights the critical role labor and the state played in shaping where and how these two firms transnationalized. We situate our work, then, in critiques of GPN theorizing which have argued that we must place TNCs’ historical evolution into wider contexts, including how states and labor actively shape their spatial development (Herod *et al.*, 2007; Ekberg & Lange, 2014). By showing how Komatsu and Caterpillar have acted in response to both internal and external forces, we suggest that the state and labor are much more important in shaping how TNCs develop than many neoliberally-inspired accounts allow.

Third, in examining how Komatsu and Caterpillar became global, we show that they have co-constituted each other across time and space. Whereas early theories treated firms as largely self-contained entities and argued that their efforts to transnationalize were primarily driven by a desire to create internal markets so as to bypass imperfections in external markets for intermediate products, thereby minimizing transaction costs (Buckley & Casson 1976), we show that how firms develop geographically cannot be understood simply by analyzing their internal dynamics but must be seen relationally, in terms of how they respond to the actions of competing firms and numerous other actors, including their own and others’ workers. Again, this provides a conceptual *entrée* to considering how labor as active agent can shape the evolution of global capitalism.

The paper is organized as follows. We first lay out a basis for understanding how firms are geographically situated and how this shapes their development, especially their desire and capacity to become global. The remainder of the paper details both TNCs’ spatial development, showing how they became global – that is, we view globalization as a historical-geographical process rather than a teleological inevitability. To conclude, we draw out implications for thinking about global firms and national economies in the geographical ways which underpin the paper.

The geography of business and the business of geography

Both Komatsu and Caterpillar sit at the heart of extensive GPNs. Their major customers include all the principal global mining and construction corporations (Rio Tinto, Vale, BHP-Billiton, Glencore, Anglo-American, the Shenhua Group, Vinci, Grupo ACS, and Bechtel). In 2019 Komatsu operated across 146 countries, had 85 manufacturing plants, a workforce of 62,000, and sales revenue of ¥2.725 trillion (US\$26.1b) (Komatsu, 2019). In that same year, Caterpillar had a workforce of 102,300, 101 manufacturing plants, 165 dealers selling equipment in 190 countries, and sales revenue of over US\$55b (Caterpillar Inc., 2019).

Coe and Yeung (2015, p. 2) define a GPN “as an organizational arrangement, comprising interconnected economic and non-economic actors, coordinated by a global lead firm, and producing goods or services across multiple geographical locations for worldwide markets”. In addition to a lead firm’s internal dynamics, they argue that five “extra-firm actors” play key roles in shaping GPN evolution: states; labor; consumers; civil society organizations; and international regulatory organizations. In exploring how Komatsu and Caterpillar became lead firms for their respective GPNs, we focus upon how both reconstituted themselves geographically for, along with managing value (how it is created, enhanced, and captured) and power (how it is deployed and maintained within GPNs), such lead firms must manage space (how agents and structures are embedded in particular territories and the challenges and opportunities this can provide). In so doing, we follow scholars who suggest that two of these five actors – the state (Smith, 2015) and labor (Rainnie *et al.*, 2011; Todd *et al.*, 2020) – should be accorded more weight than the term “extra-firm actor” perhaps suggests. Consequently, below we focus upon how Komatsu’s and Caterpillar’s workforces, together with the US and Japanese governments, crucially shaped how they became global firms. Finally, Coe and Yeung argue that different GPNs or segments thereof often intersect as common strategic partners or specialized suppliers come together. This means that whilst we can think of Komatsu and Caterpillar as central architects of their respective GPNs, each firm has been shaped by its interactions with the other. They have thus co-constituted one another.

An important aspect of these TNCs’ evolutions has involved them addressing various geographical challenges and opportunities. One way they have done so is by changing the spatial scale at which they operate. TNCs are frequently envisioned to ascend from local to national and then global scales of organization as if climbing a pre-existing ladder of social being, with each scale seen as a rung – Smith (1995) has called this “scale jumping”. However, this depiction largely ignores *how* these different rungs/scales are created and connected – that is, it ignores the political

struggles involved in firms' scalar reinventions of themselves and how this is shaped by their interactions with other actors. What we show, then, is how Komatsu and Caterpillar had to actively and consciously remake themselves as global firms – that is, they willfully had to *become* global. At first glance this distinction – viewing firms' *becoming* global as a case of them actively remaking themselves at different spatial scales versus simply colonizing pre-made scales – may seem unremarkable. However, we highlight the concept of *scale making* for two reasons.

First, it provides a way to think about how firms often spend considerable financial and other resources to remake their own scales of organization to overcome various challenges, linking what is happening at one scale with that happening at others. For example, do they choose to stay local or do they reconstitute themselves as national or global operators and what are the processes and tensions involved in this rescaling? Furthermore, it forces us to question not just how firms become global but, also, how they actively become local – that is, rather than accepting the local scale of organization as a natural foundation or starting point for all economic life, we must examine how firms localize themselves through developing relationships with particular communities near and far. Hence, Komatsu and Caterpillar have both represented themselves as local firms when doing business in their competitors' home turf through, for instance, engaging in local charitable efforts – in 2020 Caterpillar partnered with “Second Harvest Japan” to provide meals for people affected by Covid, whilst Komatsu has supported “Feeding America”, with both TNCs portraying themselves as good local corporate citizens. These activities, then, are about these global firms *becoming* local actors.

Second, in considering how firms are scaled it is imperative to recognize that how their scalar configuration is described discursively is important for how we understand their spatial structure and how they exercise power. For example, “global” firms are often imagined to sit atop the scalar hierarchy of social life with “national” ones sitting below them and “local” ones still further down the scalar hierarchy. In such a verticalist visualization, a firm's moving from the local to the national and then the global scale involves theorizing it as climbing upwards, as if ascending a ladder. This is noteworthy, as Western culture often sees things that are above others as more powerful than what lies below them. However, conceptualizing the relationship between scales in such verticalist terms is only one way to do so. If we conceptualize scales instead in terms of, say, sets of concentric rings, in which the national scale encloses the local but is itself enclosed by the global, then firms moving from local to national to global scale are viewed as extending their organization outwards from their points of origin, rather than upwards. Such a simple move from a language of verticalism to horizontalism transforms how we understand the politics of trans-

nationalization – being seen as “above” others may allow a firm to deploy one set of rhetorics about its power and positionality vis-à-vis locally embedded workers whereas being seen as “encompassing” others may facilitate different rhetorics, with all of the implications for projecting political power this brings (see Herod, 2010 for more on scalar rhetorics).

A final concern is how Komatsu’s reworking of its spatial and scalar organization has challenged Caterpillar to reconfigure its organization, and vice versa. Exploring how both firms became global and how the global (re)organization of each shaped the other is a core element of our paper. However, to suggest that the two simply “shaped” each other’s development is to greatly understate the case. Rather, we argue that the two should be seen as what Marx ([1894] 1959, p. 173) called *feindlichen Brüder* (“warring/hostile brothers”). Hence, when it benefitted them, they worked together but they also engaged in intense rivalry. As we show, these choices of cooperation and competition have had important consequences for their respective geographical organization, although significantly they have led to both firms coming to mirror each other’s spatial strategies, as both see producing in China as a solution to crises of profitability.

Komatsu’s and Caterpillar’s *pas de deux*

Early days

Until the 1960s, Komatsu and Caterpillar largely operated in isolation. Komatsu’s origins are in central Japan, where it was founded in 1917. Its early growth was built upon government largesse, producing tractors, bulldozers, tanks, and howitzers for the military. Much of its initial post-WWII growth was also abetted by the state, though in this case by the US government in the form of contracts to rebuild Japan. Having grown domestically thanks to Japanese and US government munificence, Komatsu began looking for global expansion opportunities. Its first overseas exports were made in 1955, when it sent graders to Argentina. In 1958 it inked a technical assistance agreement with the Indian Ministry of Defense that laid the groundwork for subsequently manufacturing tractors in the sub-continent.

Created through a 1925 merger between the Holt Manufacturing Company and the C. L. Best Tractor Company, Caterpillar began in East Peoria, Illinois. In contrast to Komatsu, for Caterpillar global markets were important early on. In 1922 it licensed an Australian dealer and by the 1930s had outlets in Africa and Europe. In 1936 Sydney firm Waugh & Josephson began manufacturing graders in Australia, the first known assembly of Caterpillar equipment outside the US. Demand occasioned

by Soviet agricultural collectivization helped Caterpillar weather the Depression. In the early post-WWII period, it began shifting into other overseas spaces, creating a new global scale of operations. By the 1950s, it had manufacturing subsidiaries in Brazil, the UK, Belgium, France, Mexico, and Canada.

Although each initially operated with little concern for the other's activities, the firms' isolation from each other changed when Caterpillar turned its attention to the growing Japanese market in the 1960s. Initially, Caterpillar attempted to develop a joint venture with Komatsu to manufacture in Japan. However, this failed because Komatsu was only interested in a licensing agreement. Consequently, in 1963 Caterpillar signed a 50-50 joint venture with Mitsubishi. This was extremely unusual, as the Ministry of International Trade and Industry (MITI) rarely approved joint ventures not controlled by Japanese firms. MITI's acceptance of the deal likely relates to it being keen for a Japanese firm to gain access to Caterpillar's technology and US networks (Bartlett & Rangan, 1988, p. 4).

Caterpillar's entrance into the Japanese market was a turning point in Komatsu's spatial development. Until the mid-1950s Komatsu was generally Japan-focused, renowned for poor quality and simply modeling its products on Caterpillar's, "so much so that Komatsu castings sometimes carried Caterpillar part numbers" (Haycraft, 2002, p. 183). Although it was the dominant player in Japan, issues of quality, a small overseas dealership network, and restrictive licensing agreements limited Komatsu's ability to export into key foreign markets, essentially boxing it in geographically. This made Caterpillar's entry into Japan all the more threatening, as it was now seeking to compete on Komatsu's home turf, from which Komatsu did not seem to have much of a geographical escape route. Fearing this challenge, Komatsu urged MITI to delay the Mitsubishi-Caterpillar joint venture for two years. This allowed it to transform its products, becoming one of Japan's first to introduce Total Quality Control (TQC). The result was that quality improved quickly and Komatsu secured several export orders from the Global South, orders tied to Japanese government loans. Komatsu's organizational rescaling, in other words, was a highly geographically-informed process of market-making, one largely dependent upon state policy.

By the 1970s, Caterpillar had cemented itself as the industry's global leader, with an extensive global production and dealership network – close to 50% of its sales were outside the US (Haycraft, 2002, p. 167). For its part, Komatsu was beginning to find more solid footing for its global rescaling. In 1970, after a failed partnership with LeTourneau-Westinghouse to distribute its products in North America, management established Komatsu America Corp. to sell directly to the US market. By 1975, Komatsu had sales of almost US\$1b, making it second only to Caterpillar

globally. Moreover, whereas Komatsu was previously known for poor product quality, by now its TQC program “was years ahead of anything Western manufacturers were doing” (Haycraft, 2002, p. 232). At the same time, it benefitted from Japanese government efforts to keep the Yen undervalued to aid exports. This did not go unnoticed and Caterpillar pressured the US government to do something to end what it saw as Komatsu’s unfair competitive advantage.

The above, then, shows how the state, in various forms in numerous countries, was central to both firms’ geographical expansions and rescaling activities. It also shows that their geographical structures were increasingly being shaped by one another’s actions. Finally, it demonstrates that there was no “one best route” to rescaling their activities, as both formatted their GPNs in distinctive ways. If the state as an “extra-firm actor” was important for both firms’ initial rescaling efforts, though, by the 1970s it would be questions of labor control that would increasingly drive their spatial activities.

‘Encircle Caterpillar’

Between 1975 and 1985 the two firms’ fortunes could not have been more different. Through its aggressive transnationalization strategy, Komatsu aimed to overtake Caterpillar and become the dominant force in the industry, an approach reinforced by its geographically expressive motto “Maru-C” (“Encircle Caterpillar”). Just as the state had been critical in shaping both firms’ rescaling, so, too, would labor. However, labor relations at the two firms were very different. As Haycraft (2002, p. 260) notes:

Komatsu workers took management exhortations toward the goal [of beating Caterpillar] seriously, and slogans to that effect were regularly worn on headbands in the shop. While North American workers were periodically on strike for more paid time off[,] Japanese workers took their “vacations” working... and strikes in the North American sense were unheard of.

Although Komatsu’s labor relations appeared to many in Caterpillar as “typically Japanese” (business unionism combined with paternalism), this is a somewhat simplistic picture of both Japanese employment relations – Japan experienced an annual average of 5,350 disputes and 1.66 million lost work days between 1975 and 1985 (Kuwahara, 1989, p. 7) – and of Komatsu’s employment relations, as management had to deal with the *shunto*, an annual spring offensive in which unions bargain for a nationwide wage settlement. Still, whilst Komatsu’s labor relations were not as idyllic as some suggested, the environment at Caterpillar’s North American plants was unquestionably more confrontational. In 1982 concerns that Komatsu’s labor

costs were 45% below its own, along with low global demand for earth-moving equipment, led Caterpillar to push for concessions from the United Auto Workers (UAW) union, a push met by strike action. Caterpillar's globally-scaled capacity to fill inventories, however, led the 205-day strike to fail and the firm secured give-backs (Haycraft, 2002, p. 410). In something of a conciliatory gesture, though, senior managers depicted the strike's end as the union and firm coming to an understanding that their enemy was not each other but Komatsu and its encroaching GPN.

The strike's failure can perhaps best be explained by putting it into the broader context of Caterpillar's business position, especially its relationships with Komatsu. In the early 1980s Caterpillar recorded its first losses since the 1930s. Higher labor costs and the Japanese state's pursuit of a weak Yen meant that Komatsu products were 20% to 30% cheaper than Caterpillar's US-manufactured ones (Miller & O'Leary, 2002). Additionally, consumers now demanded that it match Komatsu's warranty and product assurances. In response, Caterpillar reconfigured spatially its GPN, decoupling itself from six plants in Ohio, Milwaukee, and Wisconsin, together with Britain's Birtley factory. Equally, fear of losing market share forced Caterpillar to reverse its resistance to leasing products and providing financing to customers, services that Komatsu had offered for some time (Haycraft, 2002). Caterpillar lowered prices in Europe and Asia but sought to maintain a "price island" in North America – that is, to carve out a space in the global economy where prices would be stable – based upon the belief that US customers were willing to pay a premium for high performance equipment and assurances that any problems would be fixed quickly, so avoiding costly project delays (Greenhouse, 1984). However, competition from Komatsu forced Caterpillar to reduce US prices too. Taking advantage of its global scale of organization to avoid problems the strong Dollar caused when exporting from the US, Caterpillar showed geographical sensitivity by largely using its European operations and joint venture with Mitsubishi to produce equipment for the Global South and other overseas markets and primarily using its US plants to supply North America (Risen, 1985) – that is to say, it segregated its markets spatially to address problems caused by the overvalued Dollar. Although aided by US government loans made to foreign purchasers of its products through the US Export-Import Bank (Franklin, 2001), Caterpillar's problems vis-à-vis Komatsu were exacerbated by government policy, specifically the Reagan Administration's embargo on sales to the USSR due to its invasion of Afghanistan. This provided Komatsu with an opportunity to sign a contract with Moscow to develop a scraper using a Soviet design and Japanese parts.

At the same time, Komatsu grew more globalized, with new manufacturing facilities and a more sophisticated dealership network. Whereas in 1967 10% of

its sales were overseas, by 1975 nearly 50% were (Komatsu, 2016, p. 29). In 1976, in conjunction with the Mexican government, Komatsu began assembling large bulldozers in Mexico. In 1979 Komatsu Australia Pty., Ltd. was created. In 1981 Komatsu established a marketing subsidiary in Germany and in 1983 started a manufacturing joint venture in Indonesia. Symbolic of changing fortunes and spatial organizations was Komatsu's purchase of Caterpillar's old Birtley factory to establish a UK manufacturing base (Gray & Rapoport, 1985). Most critically, in 1985 Komatsu built a factory in Chattanooga, Tennessee, to compete directly with Caterpillar in the US. Much as Caterpillar had taken the fight for dominance to Komatsu's home turf in the 1960s, Komatsu's global reach had now come to Caterpillar's backdoor. However, whilst Komatsu's strategy to catch up with Caterpillar was proving highly successful, Shoji Nogawa, Komatsu's new president, saw the industry as too weak to sustain conflict. Consequently, he announced that "we have no intention of taking on Caterpillar and fighting them like an enemy... [W]hat is important is to have enough of a share so that we can exist and co-operate in this market" (quoted in Rodger, 1985b) – a clear indication of how he saw the two firms as "warring brothers".

By the mid-1980s, then, Komatsu and Caterpillar had rescaled and stood as the two dominant forces in the global industry. However, Komatsu's corporate strategy was still largely Japan-centric, whilst Caterpillar had aggressively internationalized its production network. At least for now, the warring brothers would concentrate on driving smaller firms out of the market rather than directly confronting one other.

Ebb and flow: competition based upon acquisitions and joint ventures

By the mid-1980s Komatsu's spectacular rise had begun to falter and Caterpillar faced declining profitability. Faced with such difficulties, how did the two respond? As before, they had their differences but both increasingly engaged in careful appraisals of the other's actions, with the state and labor critical to each firm's continued geographical reorganizations. A key element in these reorganizations was the European Commission's 1985 placing of a 27% anti-dumping duty on Komatsu excavators imported into Europe and Caterpillar's return to profitability after management and production overhauls (Rodger, 1985a). Caterpillar's strategy for returning to profitability involved hostility towards organized labor and a Japanization (or, perhaps, Komatsuzation) of the labor process, combined with the outsourcing of some production to other manufacturers or destinations with lower labor costs (Haycraft 2002, p. 318). In a geographically insightful statement, one Caterpillar manager illuminated his understanding of the interplay between corporate restructuring and geography when he stated that "[a]nyone who is going to be a low-cost producer in

the future is going to have to shop the world for low-cost components and maintain assembly in various places” (Rodger, 1985b).

Managers presented problems with Caterpillar’s competitiveness and declining profitability as a three-pronged issue involving a worldwide drop in demand, Dollar overvaluation, and disputes with the UAW. Their initial response was to lay off workers, reduce capacity, and demand that the US government deal with the Yen-Dollar issue. However, Caterpillar’s profitability continued to decline whilst Komatsu gained market share. This resulted in a major shift in the firm’s view of itself, from seeing its problems as external to viewing them as internal. Consequently, managers considered to what extent Caterpillar had structural cost disadvantages relative to its key competitors, especially Komatsu, and undertook a US\$2.2b factory modernization program at 88 plants, an initiative that amply demonstrates one firm’s influence upon the other (Miller & O’Leary, 2002).

Much of Caterpillar’s growing profitability issues resulted from how it was structured geographically and how this had shaped agreements it had made with the UAW. In particular, since the 1960s Caterpillar had operated under a so-called pattern labor agreement, with the UAW negotiating virtually identical agreements with firms across the industry. Although this worked relatively well when Caterpillar faced little foreign competition and when most of the US industry was unionized, by the 1990s it had become a significant problem, as the bulk of Caterpillar’s manufacturing facilities were in the US but much of its market and principal competitor – Komatsu – were overseas. Furthermore, Komatsu’s Chattanooga plant was not unionized and so was not party to the pattern agreement. Indeed, Komatsu had chosen to locate its plant in Tennessee precisely because the southern US is a less-unionized environment – i.e., it structured its US spatial fix to avoid heavily unionized areas. Without exiting such a pattern agreement, Caterpillar officials argued, their US facilities could not compete domestically against Komatsu or globally (Walsh, 1994). Consequently, Caterpillar wanted to impose a new labor relations regime, a strategy that led to conflictual labor relations. Whereas in 1991 the UAW sought a national contract based upon the union’s agreement with John Deere, Caterpillar argued that the practice of pattern bargaining had grown obsolete because it only leveled the playing field among competitors in a closed, domestic market (the US) and Caterpillar’s principal competition was not from US firms like John Deere but from foreign and/or non-union ones, especially Komatsu, which paid much lower wages (Franklin *et al.*, 1992). The result was an ongoing struggle between the UAW and Caterpillar from 1991 to 1998 over managers’ efforts to break up the pattern agreement. This mirrored growing tensions elsewhere – in 1987 workers occupied Caterpillar’s factory in Uddingston, Scotland, for instance.

Meanwhile, Komatsu also faced problems. Although it was developing an international assembly, distribution, and sales network, much of its manufacturing capacity remained within Japan. However, as the Yen appreciated, from ¥305/ US\$1 in 1975 to ¥121/US\$1 in 1987, Komatsu was forced to increase prices overseas and 1987 profits decreased 36% (Garnett, 1988). In response, Komatsu refocused itself geographically by ramping up production in its wholly-owned manufacturing plants in the US, Britain, and Brazil, together with joint ventures in Indonesia and Mexico – in 1987 these operations produced about US\$100 million worth of goods; in 1988 that figure more than tripled (Haycraft, 2002, p. 319). Ambitions for global growth and strong demands from local governments to invest in manufacturing facilities outside Japan led Komatsu to open additional overseas plants (Bartlett & Rangan, 1988). The result was that Komatsu reshaped its global organization, emulating Caterpillar's strategy by shifting a sizable portion of its production to low-cost locations. This allowed it to engage in an explicitly geographical labor-control strategy, that of whipsawing plants against one another. For instance, managers noted their disappointment at the UK's Birtley plant's output and product quality, warning they would look to other European locations for future expansion if there were not significant improvements (De Jonquieres, 1987). They also noted that their overseas workers viewed Japanese management techniques with skepticism. However, managers believed that Komatsu's administrative system, though more time-consuming to develop and implement, was superior to Caterpillar's, whose managers were seen as distant from the shopfloor (Tighe, 1991). Despite this, Komatsu's overseas plants experienced significant labor turnover, with employees less inclined to accept its corporate values than in Japan. Although Komatsu made a concerted effort to reduce discontent via establishment of a "Komatsu Way Promotion Unit" (Yoshino, 2010, pp. 12-16), these labor issues highlight the locally embedded challenges of firm globalization – local cultural norms often hinder firms' efforts to globalize production.

The mid- to late 1980s also saw Komatsu set up other joint ventures or licensing agreements, particularly in the Pacific Rim. It opened facilities in Indonesia, Thailand, and Vietnam, and signed license agreements with several firms in China and Samsung in South Korea (Haycraft, 2002, p. 322). It also established a 50-50 joint venture (of which it eventually took full control) with German firm Demag to produce large excavators. In 1988 Komatsu initiated a 50-50 joint venture with US producer Dresser Industries to combine manufacturing resources in the Western Hemisphere. Six years later, it took complete control of Dresser, thereby securing 2.3 million square feet of North American manufacturing space. For its part, Caterpillar's global restructuring strategy – the Komatsuization of production and its plant

closures of the early and mid-1980s – eventually produced the results it was seeking. In 1987 it announced a profit of US\$350m, its largest since 1981 (Garnett, 1988). By the early 1990s, then, Caterpillar had re-asserted itself as the industry's global leader, leading Komatsu to abandon its aggressive 'Encircle Caterpillar' strategy as it worked to consolidate its global position as the sector's second global giant.

In sum, combined with a global consolidation of the industry, during this period the warring brothers had begun to shift attention away from traditional markets in Europe, North America, and Japan and, instead, increasingly focused upon emerging economies like the former-USSR, Southeast Asia's tiger economies, and, especially, China. Concurrent with this shift in geographical focus were efforts by both firms to maintain economic advantages and control over their workforces within their existing spatial organization.

China and the warring brothers

China's rapid urbanization has offered both Komatsu and Caterpillar opportunities. In the 1990s Komatsu began a geographic reorganization to avoid problems caused by Yen appreciation and expanded into new product markets (electronics, plastics, and robotics). It announced a five-fold rise in the volume of components its European plants were purchasing from low-cost suppliers in Eastern Europe (Marsh, 1997) and expanded activities in North America, selling there, for the first time, its own version of backhoe loaders, a market dominated by Caterpillar. Komatsu also cut subsidiaries' workforces by as much as one-third and, in 2002, its own domestic workforce by 5% (Yoshino, 2010, p. 5). For its part, Caterpillar had sought to establish itself as China's dominant construction machinery supplier. To do so, it signed an agreement with a local wheel-loader manufacturer and joint ventures with state-owned Chinese manufacturers, over which it would later seek to take control (Grant *et al.*, 2004), and sought state approval to create its own finance firm to fund its equipment manufacturing and to help build an innovation center in which to develop new products (Lau, 2003, p. 12). Caterpillar also hoped to capitalize on the early to mid-2000s global mining boom, especially in the Global South. This involved remaking its own geography. As Chairman Jim Owens explained (quoted in Grant & Marsh, 2004):

Mining is increasingly... being done in the developing countries... [W]e are the major equipment provider for the global mining, oil and gas industries, so we're going to go where that growth is.

Thus, whilst Komatsu was developing new products and pushing deeper into North America and Europe, Caterpillar engaged in a more significant thrust into the Global South. In 1997 it announced a US\$100m investment in small-scale machinery to “tak[e] the fight into its competitor’s territory”, particularly China, forming joint-ventures with Shanghai Diesel and the Xuzhou Construction Machinery Group (Marsh & Wagstyl, 1997). Indeed, it expected large returns from China, where annual sales were projected to climb five-fold by 2000. However, despite increased investment, Caterpillar remained far behind Komatsu in China, which has sold there since the 1950s (Palepu *et al.*, 2014).

By 2011, Caterpillar claimed 27 provincial dealerships and over 300 dealer outlets across China, of which 82 were established in that year alone (Caterpillar Inc., 2014). Indeed, this expansion led Caterpillar vice president Mike DeWalt to make a profoundly geographical claim: “we are in some ways more Chinese than [our] Chinese competitors” (*The Australian*, 2014). Caterpillar also announced plans to switch “as much as possible” its sourcing of complex parts for its Chinese factories from Japan to China (Weitzman, 2010), localizing that part of its GPN. In similar fashion, Komatsu also sought to use the global commodities boom and China’s insatiable demand for industrial machinery as a growth catalyst. Masahiro Sakane, Komatsu president, suggested that “from now on we need more manufacturing bases in China” (Sanchanta, 2004). Much like Caterpillar, Komatsu’s future growth was tightly linked to China and it hoped that China would soon account for a third of world demand (Marsh, 2010).

As Komatsu and Caterpillar become ever more embedded in China, the knock-on effects of working with the country’s state-controlled unions could be significant, especially in an era where unions are trying to develop global strategies to confront capital – in 2010, for instance, unions representing Caterpillar workers across the planet agreed to form a network under the aegis of the International Metalworkers’ Federation (now IndustriALL) to coordinate activities and share information. This has involved them quite literally mapping Caterpillar’s investments to understand its geographical organization as a starting point for challenging it (Goods, 2017). Nevertheless, relocation of a significant proportion of their global production to China is very much part of a new geography of union avoidance by the two firms. Quiescence by official Chinese unions also means that unions in other parts of the world will likely be undercut – at the 2016 Global Caterpillar Network Meeting held in Detroit, for instance, union officials learned that the Chinese and Brazilian Governments had signed a trade deal allowing China to sell heavy machinery into Brazil for half the price of Brazilian-made ones (Goods, 2016). Although there were several strikes in Brazil to try to protect workers’ interests, these were largely unsuc-

cessful. At the same time, however, growing labor unrest across China (Brown & Kai, 2017) and tentative efforts to create independent unions – efforts the regime fervently opposes – perhaps open opportunities for unionists outside China to make some headway.

Conclusion

In showing how Komatsu and Caterpillar remade themselves into global firms, we have highlighted several issues for understanding firm transnationalization.

First, managing their spatial fixes has been crucial to these firms' competitive positions. Through processes of strategic coupling and decoupling they have added some locations to their GPNs and excised others. This has linked certain workers and delinked others, with critical implications for labor – as some communities are brought into conversation with one another, others are removed. This is especially so because of where both firms have ended up: China. Given that China's dominant labor organization – the All-China Federation of Trade Unions – is state-controlled, it frequently pursues government economic policies rather than seeks to empower workers. This represents a significant challenge to organized labor elsewhere. At the same time, though, there are still opportunities for workers at the two firms (and others) to develop solidarity links – in June 2018, for instance, delegates from Caterpillar plants in Japan, the US, and Europe invited guests from Komatsu's union to attend their annual network meeting to exchange experiences. Furthermore, the spatial fixes these firms have adopted to manage their workforces (labor as object) have also shaped union tactics in response (labor as subject). Hence, Caterpillar's policy of producing parts that are interchangeable globally and ensuring that it does not rely upon a single plant for products gives it the ability to easily shift production should it be disrupted in one place. However, whilst this insulates the firm from strikes in one country, it encourages workers to organize transnationally and to share knowledge about company policies to gain purchase against it (Kozłowski, 2011, pp. 77-78). This has largely been done via the Agricultural Implement Industry Council of the International Metalworkers' Federation, which since 1971 has provided a forum for workers from Caterpillar, Komatsu, International Harvester, Terex, Massey-Ferguson, and other manufacturers to meet to develop plans to confront producers, thereby shaping these firms' global investment strategies.

Second, the history recounted above shows how firms must engage in a complex negotiation of global-local tensions as they become global actors. Both have stretched their operations beyond their origin regions. This has required they be intimately aware of differences between places – becoming locally embedded in dif-

ferent communities across the planet has been just as important as has creating a new global scale of organization. Taking seriously how firms address local geographical challenges is, then, important for understanding their spatial evolution and rescaling. Contra arguments that geography and the particulars of place are becoming less significant with globalization, we suggest that managing their geographical organization – and responding to that of their competitors – was key to both firms' development. By illustrating how each actively created global scales of operation, we present their globalization not as an inevitable end point to their development but instead as something that is subject to political contestation and which they had to actively bring about. Furthermore, as we have seen with the demands that Covid has placed upon managing spatially extensive supply chains, it is also possible that firms can “deglobalize”, if they see this as beneficial. Becoming global is not, then, a unidirectional process but a strategy pursued at specific times to secure specific goals. Managing the spatial scales at which they operate, in other words, is a central element in firms' economic behavior.

Finally, though their evolution was certainly shaped by internal logics, both firms' development paths were closely interwoven with the actions of the state, their workers, their own and other GPNS, and each other. This means that we must view these other entities as active players in firm transnationalization and not just as passive bystanders or victims thereof. The unevenly made economic geography of global capitalism is not simply the result of the activities of TNCs – the lauded global actors of the neoliberal imagination – but is deeply contested. This has implications for theorizing capitalism's geography and the flow of investment, value, and commodities from one part of the globe to others. Both firms had to manage labor but did so in different ways, which has shaped how their GPNS operate – Caterpillar has had a much more adversarial relationship with its workers than has Komatsu. At the same time, these firms' workers have played active roles in shaping how their GPNS have been structured. For instance, when Caterpillar announced it would close its Sagamihara plant in Japan in 2018, the plant's union managed to keep redundancies to a minimum and helped many workers transfer to other firms or to Caterpillar's Akashi plant (IndustriALL, 2018). At the same time, though, the rise of the so-called i4.0 economy, with its labor-saving robotization and automation, may mean that the types of labor both firms need will change, from low-cost semi-skilled production line workers to high-skilled engineers and computer operators. As the i4.0 economy develops, then, China may well not be the last stop on the globalization train for either firm, such is the restless geography of the global economy.

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Abstract

Warring Brothers: Constructing Komatsu's and Caterpillar's Globalization

We detail how the world's two largest engineering machinery firms, Japan's Komatsu and the US's Caterpillar, actively managed geographical concerns to become global actors. We argue that their globalization was not a teleological given but had to be proactively made. Both the state and organized labor played significant roles in shaping their geographical evolutions, as did their efforts to outmaneuver each other spatially. Their globalization, then, was part of a broader spatial politics under capitalism.

Keywords: Geography; Global production networks; Global scale; Komatsu; Caterpillar.

Resumo

Irmãos em guerra: construindo as redes globais de produção da Komatsu e da Caterpillar

O artigo compara os caminhos percorridos pelas duas maiores empresas de máquinas de engenharia do mundo, a japonesa Komatsu e a americana Caterpillar para se tornarem “atores globais”. É investigada a forma como ambas as empresas gerenciavam ativamente as questões geográficas à medida que cresciam. Como “irmãos em guerra”, elas não apenas competiam entre si, mas, ao longo do processo, acabaram por moldar a forma organizacional uma da outra enquanto construía ativamente a escala global de sua própria existência – sua globalização, em outras palavras, não era um dado, mas teve de ser construída proativamente. Tanto o Estado quanto o trabalho organizado desempenharam papéis significativos no desenho das evoluções geográficas de ambas as empresas.

Palavras-chave: Globalização; Geografia; Redes globais de produção; Escala global; Komatsu; Caterpillar.

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