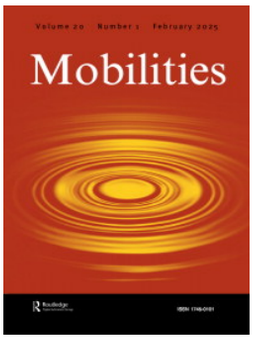

Mobilities

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/rmob20

Supply-chain infrastructure as architecture: a case study of Amazon in Darlington, UK

Joel Maddock-James

To cite this article: Joel Maddock-James (16 Mar 2025): Supply-chain infrastructure as architecture: a case study of Amazon in Darlington, UK, Mobilities, DOI: 10.1080/17450101.2025.2477173

To link to this article: https://doi.org/10.1080/17450101.2025.2477173

Published online: 16 Mar 2025.

MOBILITIES
https://doi.org/10.1080/17450101.2025.2477173

Supply-chain infrastructure as architecture: a case study of Amazon in Darlington, UK

Joel Maddock-James

York St John University, York, UK

ABSTRACT

Using its 'fulfilment centre' in Darlington in the North East of England as a case study, this article first assesses Amazon's existing arrangement in the UK economy, pointing to the spatial concentration of distribution centres that makes up its fulfilment network in this area. It frames Amazon's decade-long growth as an expansionary fix to the problems of saturation and congestion that inundate the Golden Triangle of industrial logistics elsewhere in the country. It then illuminates the business of logistics by documenting the economic arrangements brokered by multiple actors that propelled the development into motion. It recognises Amazon as the ultimate beneficiaries of recent economic turmoil by investigating how platform power allowed them to ride out recession in becoming providers of last-mile delivery services. Finally, once the various scales of governance that need to be leveraged for the space-making to occur have been established, it finishes by returning to the town of Darlington to grapple with the construction of Amazon's fulfilment centre there. Altogether, this article argues that through its logistical network Amazon is erecting a supply-chain *infrastructure as architecture,* which establishes the importance of mobile horizontality to the dominance of vertical enterprises like this logistics and e-commerce giant.

ARTICLE HISTORY
Received 14 June 2024
Revised 10 January 2025
Accepted 25 February 2025

KEYWORDS
Infrastructuralisation; logistical space; online retail; spaces of flow; transport

Introduction

The physical presence of Amazon, the logistics and e-commerce company, is evocative of the way that contemporary urbanisation is organised through flows in the name of hypermobility, and that logistics first and foremost produces a reading of space as an infrastructural environment, rather than an architectural one (Lyster 2016, 150). For one thing, there is little aesthetic value to be found in Amazon's fulfilment centres, resembling the 'big-box' architecture of an Ikea urbanism that presents as visibly mute on the edge city (Lewis 2005; Martin 2008; Hill and Martin 2017). Moreover, the size of some of the warehouses in Amazon's fulfilment portfolio exceeds what we might consider as coming under the traditional field of architecture. Because their dimensionality is calculated in acres, they more accurately reflect the properties of *landscape* (Lyster 2016, 153–4).

CONTACT Joel Maddock-James j.maddockjames@yorksj.ac.uk York St John University, York, UK

The scale of Amazon's facilities can be theorised under the 'mobilities paradigm' or 'mobilities turn' in sociology, transport studies and spatial science, which together have incorporated new ways of theorising the politics of movement (Sheller and Urry 2006; Anim-Addo, Hasty, and Peters 2014; Steinberg 2015). Insofar as engineers are motivated by developing innovative ways to move people and things freely around the earth, horizontality has proved its worth time and again in advancing 'regimes of flow' (Hannam, Sheller, and Urry 2006; Delfmann et al. 2010). Amazon escalates a sprawling tendency that has been the industry norm since the postwar period. In an Amazon warehouse, an infrastructure that generates linear pathways for commodities to move from one stage (picking) to the next (packing) is vital to a fast and repetitive flow of objects and is achieved through technologies that utilise the ground. In addition, fulfilment centres must be wide enough to accommodate the constant stream of trucks replenishing inventories, with rolling steel doors keeping the flow of products and materials moving efficiently. Modern logistics rejuvenates the value of the ground not only as a surface for flow but also in terms of the production of space, suggesting we must move from viewing infrastructure *and* architecture to infrastructure *as* architecture.

This article unpacks the post-architectural spirit of Amazon's landscapes in demonstrating how towns succumb to the logic inscribed in infrastructure space. It does so through one spatiality in particular: the recently constructed fulfilment centre in Darlington in the North East of England. If the overcoming of space is contingent on the production of space (Smith 1984; Harvey 1985a; Brenner 1998; Castree 2009), then infrastructuralisation is its end game. Amazon must infrastructuralise space (Plantin et al. 2018, 295; Hill 2020, 4; Langlois and Elmer 2019) to control the flow of commodities that exists therein, using logistics – as constituted through a composition of nodes of localised physical sites and lines of logistical routes (Cuppini 2017, 502) – as an organising principle (Easterling 2004). Logistics in this sense allows for the modelling of the world as a 'series of economically valued objects and relationships' (Neilson 2012, 332). Such infrastructures produce their own spatial form in transforming towns and cities into terminals of logistical activity, allowing platforms like Amazon to execute their dominant conception of space (Lefebvre 1991) in local environments and extend their logic far beyond the warehouse. Developments in Darlington can help us generate a deeper understanding of this sociospatial trend in a local context, where architecture is invited into a dialogue with infrastructural power. Unpacking the critical points where logistics, infrastructure and geography collide in a regional setting, this article maps the forces binding them together in order to deliver a materialist analysis of Amazon's incursion into the North East of England against the backdrop of an increasingly blurred relationship between infrastructure and architecture in the era of supply-chain capitalism.

The rise of infrastructure as architecture

The concept of supply chain infrastructure as architecture has it genesis in what Michel Foucault observed as the waning influence of architects on the spatial environment from around the turn of the nineteenth century (Foucault and Rabinow 1984). For Foucault, modernity presented new spatial configurations and problems that extended far beyond the domain of rudimentary urbanism and architecture. Older ways of thinking about space as predominantly territory in need of policing no longer held. Instead, the new masters of space were the 'engineers and builders of bridges, road, viaducts, railways, as well as the polytechnicians – those are the people who thought out space … the technicians or engineers of the three great variables–territory, communication and speed' (Foucault and Rabinow 1984, 244). Under this new settlement, logistics assumes the role of an organising principle of the urban environment, one that is concerned less with space as the realm of pure aesthetics and more a fundamentally instrumental terrain to foster spatio-temporal flows of people and things that advance existing social relations and economic processes.

This has been the direction of travel at least since the Napoleonic years when logistics first proved central to the economics of warfare, as we read in the accounts of Virilio (2006) and Cowen (2014). Likewise, the Second World War and the Vietnam War were turning points in the formation of a technological base capable of facilitating a 'modernity of logistics' (Bratton 2015, 232). Attewell (2021) assigns to the latter war the accomplishment of devising a complex logistics management system capable of resolving much of the supply-chain friction that had previously bedevilled transnational transportation highways. Only when capitalism underwent its systematic crisis of overproduction that amounted in a global profitability crisis towards the end of the 1960s, however, did the effects of the 'logistics revolution' (Bonacich and Wilson 2008) find their way into the realm of the built environment proper. Up until this point, logistics was by and large seen as a *means to an end;* a necessary evil between production and consumption where no value could be added (Newsome 2010, 191). This was until it became widely recognised that reducing turnover time and speeding up the *realisation of value* (Chua 2019) through a spatio-temporal logistical fix (Danyluk 2018) within capital's circulatory systems proved remarkably successful in offsetting some of the contradictions that the Fordist system could no longer harbour.

Capital being what Harvey (2018, 194) describes as 'value in motion' in his reading of Marx's *Grundrisse* (1973), the new technological frontier (mainly containerisation) and organisational paradigm (mainly just-in-time philosophy) underpinning modern logistics allowed distribution at once to better guarantee value as well as add to it by deliberately blurring the lines between moving and making (Arboleda 2020, 115). Logistical processes therefore set out to control the temporalities of accumulation like never before. They could only do so, however, having established a strong enough infrastructural presence. Hence in the final few decades of the twentieth century, capitalism, embarking on its latest phase of 'time-space compression' (Harvey 1989), was accompanied by vast territorial reorganisation within its second nature. Put simply, a basic prerequisite of the *annihilation of space by time* (Marx 1973, 524), is the production of space. New accelerations were secured through the formation of new spatial organisations and immobilisations – what Brenner (1998, 477) calls a 'scalar restructuring'. Warehousing assumed a critical role in the spatial reproduction of post-Fordist capitalism. This is because the circulation of value requires a physical circulation of the material objects in which value is embodied (Smith 1984: 126), state of the art, specially engineered spatial formations that link up economic geographies and reduce the friction created by distance. Thus the implosion of infrastructure into architecture is born out of the geographical contradiction between 'the rising power to overcome space and the immobile spatial structures required for such a purpose' (Harvey 1985b, 150), resulting less in a global factory than in a global warehouse (Orenstein 2019: 18).

Forty years on from Foucault's aforementioned observation, communication and speed command even more authority over how we organise our physical surroundings. The ascendancy of the railroads in shaping urban development has been usurped by the even greater force of containerised commodity flows. The ability to deploy capital to compress supply-chains transformed the organisational infrastructure of global capitalism and turned logistics into a value-driven, profit-seeking industry with an expansionary logic. In choreographing the flow of material, data and people, modern time-space networks have developed an unrelenting spatial appetite. Architects were the first to acknowledge this new reality. As Lyster (2016, 1) argues in *Learning from Logistics: How Networks Change our Cites*, 'we can no longer afford to read the city solely in terms of the architectural object … if designers are to stay relevant in urban matters, we must shift to engage the city from the perspective of its operational systems and procedural flows'. She continues: '…in the space of flows, at best, infrastructural systems dominate, and architecture takes a backseat' (Lyster 2016: 149). The moment logistics transformed from cost minimisation *after production* to value added *across circulatory systems* (Cowen 2014, 24) was the very same moment that supply chain infrastructure became architecture.

Easterling's *Extrastatecraft: The Power of Infrastructure Space* (2016) brings us one step closer to an absolute understanding of this concept. The claim that '[s]ome of the most radical

changes to the globalizing world are being written, not in the language of law and diplomacy, but in these spatial, infrastructural technologies…' (2016, 15) speaks directly to the spatialising effects of corporations like Amazon, whose ubiquitous and standardised infrastructure paradoxically dominates the landscape and yet is hidden in plain sight (2016, 21). The power of an Amazon build does not reside in how it arrests ones gaze or demands recognition. Rather, its fulfilment network of supply-chain infrastructure can be likened to software, whereby its authority derives from its organisational logics that belong to a totality of information and action. Western idealist conceptions of buildings as singularly crafted enclosures that are uniquely imagined by the free thinking architect have given way to a formulaic method of design, an iron cage of urbanism that determines how objects and content are organized and circulated (Easterling 2016, 11-13). Architecture has always consisted of a series of mathematical and geometrical relationships that are obscured in its manifestation – the Platonian 'irreconcilable discrepancy' between form and perception (Hendrix 2006, 13-14). What is concealed in the incompatibility between form and content in Amazonian architectures is arguably even more extensive because their form is different to that of conventional builds. Since with infrastructure space, *the action is the form*, what is concealed is the activity of the infrastructural matrix (Easterling 2016, 13-14) that consolidates Amazon's platform power via the processes of vertical economic integration.

Amazon is only one in a multitude of global forces reaping the rewards of extrastatecraft that Easterling sets out so well, but the rise of logistics as an organising principle of global capitalism makes it a particularly strong one, since Amazon has transformed logistics into a *just-in-time* service by positioning itself as a platform intermediatory that buyers and sellers grow increasingly dependent on for market access. Reckoning with that strength requires examining the intricacies of the act of infrastructure space-making, which this article seeks to do through a case study of Amazon in the town of Darlington in the North East of England. First it assesses the spatial concentration of distribution centres that makes up Amazon's fulfilment network in the United Kingdom, framing the platform's decade-long growth into the North East as an expansionary fix to the problems of saturation and congestion that inundate the 'Golden Triangle' of industrial logistics.

Spatial distribution of Amazon's fulfilment network in the UK: from the Golden Triangle to the North East

As De Silva, Sano, and Hatoyama (2020, 152) point out, Amazon have largely pursued a polycentric pattern of urban development in the United Kingdom by clustering facilities in the urban corridor between North West London and Manchester via Birmingham in a bid to enhance its regional delivery capability. These facilities represent part of a number of revolutionary developments in the structure of supply-chains since the turn of the twentieth century, in which new sites designed to support e-commerce through functional specialisation trigger vast changes in land use patterns and real estate markets of cities (De Silva, Sano, and Hatoyama 2020, 150). Amazon are an early mover in the geographical scaffolding of the e-commerce sector, targeting medium-sized cities where the clustering of e-commerce related facilities of other firms can be promoted and the planning and zoning requirements of this type of logistics satisfied (De Silva, Sano, and Hatoyama 2020, 156). In their wake they leave a spatial footprint that may be of interest to other firms in the future. For example, Amazon's distribution centre in Darlington has prompted the council to submit plans for a 24-acre industrial and distribution park neighbouring the fulfilment site (Dodd 2022). This sort of spatial concentration can be understood as a *clustering* into *growth poles* and a means by which logistics companies enter into positive feedback loops feeding off increased activity and reduced overheads (Sheffi 2012, 87-121). Given the distinctive functional and organisational requirements of this kind of land use, where the

dominant conception of space must be its *only* conception, such clusters have a significant geographical impact.

If one were to search for a sense of the material impact of Amazon that De Silva, Sano and Hatoyama call attention to, the cartographic growth of its labyrinth of distribution warehouses clustered across the Midlands of England would be a decent place to start. This is where spaces of flows are exemplified in their crudest form, with operationally mobile spaces geographically fragmented over calculated distances, linked together through infrastructural arteries, cybernetic systems of wires and roads. In towns like Rugeley and Tipton and cities like Coventry, for example, Amazon has successfully managed to spread its network effects by establishing a concrete foothold in a local market setting, a regional presence in a global online arena.

Naturally, a lot of Amazon's sites have mushroomed in and around what in the logistics industry is referred to as the Golden Logistics Triangle (Lupton 2018) to denote the vast area of prime real estate for high density distribution in the East Midlands located between the M1, M6 and M42 motorways, starting as far south as Northampton and stretching as far west as Birmingham and as far north as Nottingham (with expansion into Yorkshire in sight) (see Figure 1). Encompassing over 600 square miles, the Golden Triangle is recognised by the Office for National Statistics (ONS 2022) as the optimum place for warehousing in the UK because of its strategically placed coverage, being within a four-hour drive of ninety percent of the British population. Other advantages include a large-scale employment density of low-skill labour, along with land costs and congestion rates that continue to be favourable comparative to London. Altogether, this sprawling terrain illustrates the spatial impact of the historical turn towards mobilities-based planning that reconfigures spatial scales to unlock new pathways for the distribution of capital. It has, unsurprisingly due to horizontal requirements and lack of planning regulations, heavily targeted peripheral zones. For example, Amazon have fulfilment centres in the outskirts of Daventry, Kegworth, and Coalville – all within a whisker of the M1.

Just as the Golden Triangle was in part a concomitant to the scarcity of available property in and high rents of London, it too has become saturated with spatially intensive activities and has been met with rising rents that have generated an appetite for a spatial expansion beyond the confines of the Midlands (Lupton 2018). Furthermore, the Midlands' access to international gateways like ports and airports harbour significant 'masked' costs and overheads through the risk of late delivery that becomes apparent during roundtrip journeys that exceed allowable costs (inventory charges and late fees) (Tenekeci 2020, 1-4). Congestion and saturation suggest that the future of logistics as a spatial phenomenon exists outside the Golden Triangle.

This would appear to run in tandem with the geographical demands and functional requirements of the 'pull' models of distribution associated with business-to-consumer (B2C) e-commerce and inbound logistics, which are more spatially dynamic and seek out last mile distribution sites located peripherally to major population centres for same-day delivery. To execute rapid delivery, Amazon needs to stack warehouse space near concentrations of Prime households, meaning it was only a matter of time before the platform would break into new logistical territories of growth across relatively untested regions of the UK. State subsidies played their part here. According to a Watchdog report, there are 407 Amazon facilities in 13 countries 'where evidence exists or there is reason to believe that Amazon has received public monies for its projects', although this information has not been officially disclosed (Kaori Gurley 2022). This may have contributed to why, of the four million square feet of fulfilment floor space in the UK taken by Amazon in 2017, 82% was *outside* of the Golden Triangle (Savills 2018). These include the purchase of land in Bristol, the North West, and, crucially, the North East of England.

As an incubator for contemporary logistical landscapes, the North East was virtually untouched by Amazon prior to 2018, when it was reported in the *Darlington & Stockton Times* (Gullon 2018) that a 'major international retailer' was in talks with logistics developer DB Symmetry to forward-fund a £120.7 m distribution centre in proposals for a new business park in the eastern outskirts of Darlington. Most were immediately aware that this was code for

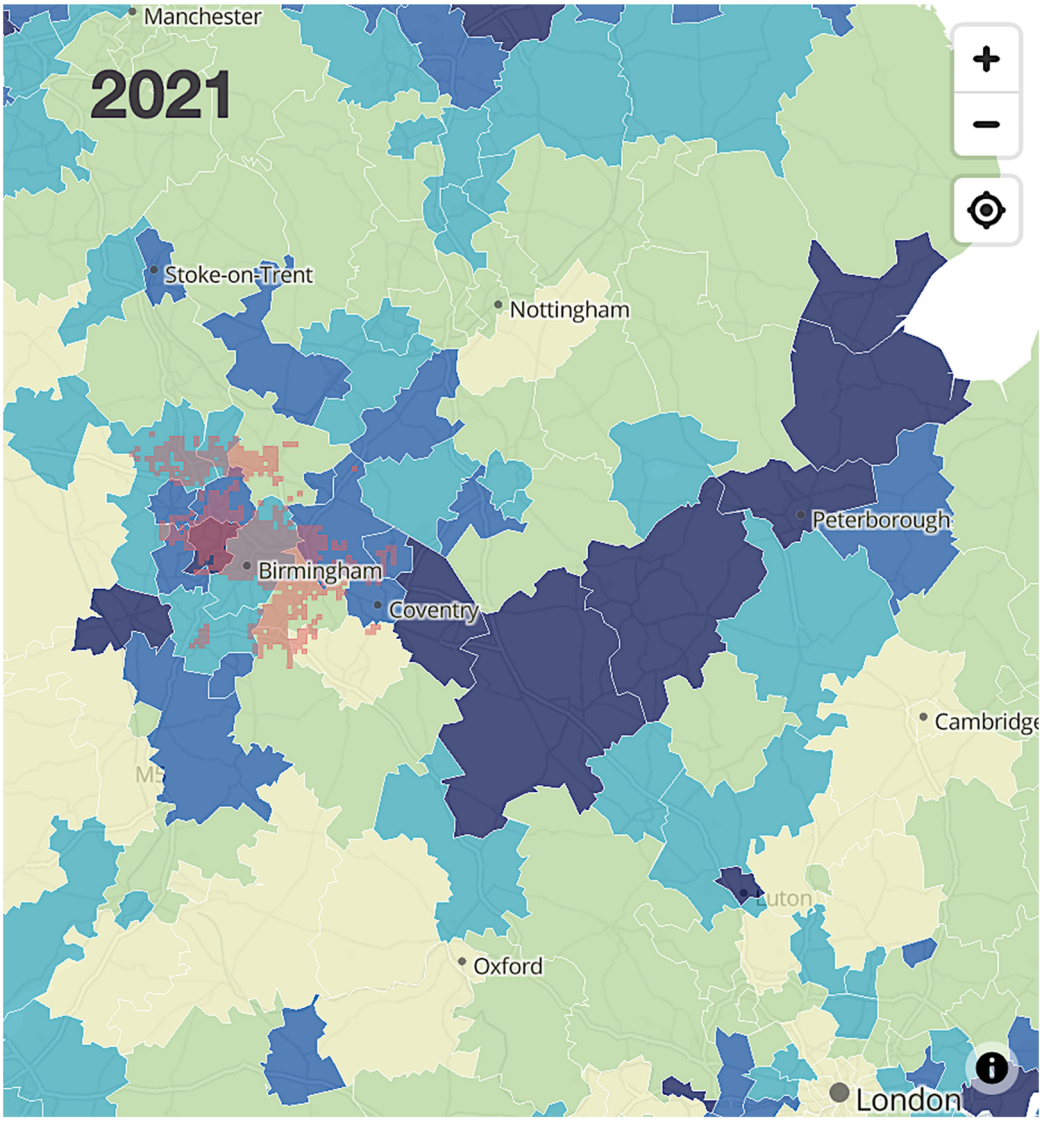

Figure 1. The Golden Triangle of Logistics in the East Midlands of England, 2021. Source: Reproduced from the Office for National Statistics—Inter-Departmental Business Register with the permission of the Open Government Licence for public sector information. (ONS 2022).

Amazon, which soon became Darlington's 'worst kept secret' as the platform kept its plans firmly under wraps (Scott 2020). The distribution centre was touted as the largest of its kind in the region, bringing significant attention to the market town. It was described in the *Northern Echo* as a regional success story and a 'major coup' for an area haemorrhaged by under-employment (Hetherington 2018). In the years since, further planning has been secured in nearby Bowburn and Follingsby, and a new site has recently been opened in Wynyard off the A19 near Stockton, a little more than 15 miles from Darlington (Scott 2022). In the transmission age of just-in-time logistics and superfast delivery, it made economic sense for Amazon to diversify its operations and cluster new warehouse space around regions with gateway access to large population densities of potential Prime customers; to advance a *silver triangle of logistics* in the UK. However, the specific story of why Amazon chose to begin its endeavours

in the North East via the periphery of a former industrial town requires a deeper explanation, since Amazon does not enter into spatial production in a vacuum, but rather as an outgrowth of distinct and geographically localised histories attached to place.

Amazon in Darlington: geographies of flow

As a point of entry, we can start by referring to a local development report drawn up by Darlington Borough Council (2016, 100) to target long-term investment and growth in the region, where a specific convergence of major roads, railways and airports was identified as a lever for economic attraction in the domain of transportation and infrastructure. In the report, Darlington is identified as a gateway to the Tees Valley, containing many key elements of the sub-regional transport network and being the point of arrival for those arriving by road via the A1(M) and A66, by air via Durham Tees Valley Airport and by rail from Darlington Station on the East Coast main line. With mobility key to economic growth in supply-chain capitalism, councils ordinarily leverage local geographic advantages like this by offering up spaces in their boundaries as sub-regional nodes in larger networks of capital flow that in turn create objective conditions of engagement, creating their own fixed and standardised local actors within national and global supply-chains (Sassen 2006). This, for Easterling (2016, 15), would constitute part of our addiction to 'incentivised urbanism'. For its part, Darlington is strategically positioned between the influx of freight coming from the South and large densities of consumers living in Tees Valley and not much further from Tyne and Wear. It might also provide an inventory point *to* London, as well as Leeds, Newcastle-upon-Tyne and Edinburgh via the A1(M), given that items sold by certain vendors may only be stocked at a particular site, awaiting dispatch to any location.

Partnering this, the next indication that the area is rich in the attributes of a logistical landscape is displayed in its peripheral, rurban nature. Stationed in the easternmost point of the town in the land north of Yarm Road between Lingfield Way and the A66 Bypass, it is proximal enough to enjoy the social infrastructure and amenities of Darlington while circumventing the congestion, high rents and regulations of the urban townscape. It also sits within 15 miles of Teesport and not much further from another cargo port in Hartlepool, opening up the regime of flow to Europe and other parts of the world. This previously overlooked space in the Darlington hinterlands has allowed Amazon to create an engineered spatiality by leaning on the specific geographical advantages of the post-industrial periphery. The spatial arrangement of the *peri-urban* – not quite urban and not quite rural; within close enough range to enjoy city infrastructure and the spaciousness of the countryside; and with VIP access to the arteries and veins of Britain's transport network – makes for a terrain that is in keeping with the decentralised, postmodern geographies of a post-Fordist capitalism with its fixation on movement as growth and mobility as progress. The morphological composition of the outskirts of Darlington represent a *distributed place* (Cidell 2015) where suppliers can arrange, organise and direct inbound commodity flows through a specially engineered logistical zone. Logisticalising these spaces follows a historical pattern of the industrialisation of the metropolitan periphery that has swept the West ever since the tide of deindustrialisation condemned the factory town and triggered the selective abandonment of the urban inner core as a means to deal with its deepening contradictory tendencies (Soja 1989, 72). Urban growth in the hinterlands of Darlington is burgeoning, owing to companies like Amazon who see its decentralised position as not a hinderance but inversely as advantageous to its nationally-scaled fulfilment network.

In March of 2018 planning permission was granted by the council for the development company Tritax Symmetry to commence in the construction of one class B8 (storage and distribution) warehouse alongside a new estate road with car and lorry parking just north of Morton Park. Tritax Symmetry's procurement with Amazon exists in an economic context of a booming industry for contractors employed in distribution centre development, with one in five purchases in Britain now web-based and the UK's online shoppers spending more per

household than consumers anywhere in the world (Wilmore 2018). Understood as the rentiers of warehouse capitalism, Tritax Symmetry develop land that is pre-let to online retailers like Amazon, enjoying the spoils of a world crafted in the latter's image. For Tritax Symmetry, location is everything because, as we have already learnt from Lyster (2016, 157), the basis of logistics is nothing if not the ground upon which it is geographically rendered: 'ground is the first built surface of a logistical site and the base from which the rest of the interior is fabricated'. To own fertile ground is to possess a future asset of a value chain.

Amazon's spatial expansion into Tees Valley also involved several accompanying private economic actors like Lichfields, The Harris Partnership, JPG group, Cluttons LLP, and Hollis that provided consultancy advice on a range of matters pertaining to planning and development, architectural design, civil and structural engineering, chartered surveying, and development monitoring respectively. The entry into direct landownership of such agencies is a development that dates back to the early twentieth century (Massey 1980, 263). This multifaceted approach reflects a growing recognition of the 'industrial amalgamation' process wherein a combination of intra-firm and interfirm relationships focuses on the operations of a dominant 'propulsive' firm (Chapman 2005, 598). As Easterling (2016, 15) notes, large infrastructure projects need an administrative authority comparable to that of the state in the form of 'new constellations of international, inter-governmental, and nongovernmental players'. Evidently, space-making has become the joint venture of a collection of capitalist firms cultivating information-based relationships to execute a dominant conception of space in the *here and now*.

Having identified the local set of actors that are mobilised in the service of supply-chain infrastructuralisation, this article moves next to an address of the global economic backdrop against which that mobilisation can occur. It recognises Amazon as the ultimate beneficiaries of recent economic turmoil by investigating how platform power allowed them to ride out recession in becoming providers of last-mile delivery services in a rapidly expanding e-commerce market. These are precisely the material conditions where extrastatecraft finds its feet, for which the 2010s will go down as a critical decade in Amazon's global territorial diversification.

The global forces behind Amazon's infrastructuralisation

There are a number of other factors of *extra-geographical* nature to be chewed over if we are to reckon with Amazon's entry into Darlington as part of broader decade of spatial expansion. Notwithstanding the loss of manufacturing following historic deindustrialisation, the most obvious starting point is to gauge how the economic decline following the 2008 financial crisis shaped the short-term trajectory thereafter. Shocks to the global economy over this period proved gainful for Amazon, who jumped at the opportunity to move into regions recovering from recession and desperate to attract private investment (Semuels 2018).

The financial crash laid the foundations for an Amazon takeover by accelerating trends of high street decline and job losses in the retail sector. Exacerbated by rising property rents, steep business rates, and an inevitable drop off in effective demand, the recession gave way to a surge in vacant units in town centres, especially in the North East, with household names like Toys 'R' Us and Maplin going bust and chains such as Marks & Spencer, Debenhams, Wilko, and House of Fraser shedding a significant number of brick-and-mortar stores. Between 2011 and 2018, this downturn amounted to a net loss of 12,671 retail jobs in the North East (Wallace-Stephens and Lockey 2019).

That the financial crisis hastened the decline of brick-and-mortar capitalism in the North East of England need clearly be appraised within the framework of the other dominant global current encompassing nationally scaled economies: the totalising presence of transnational online retail superstores. This descent in fact runs proportionate to the growing market share of B2C e-commerce and with it the number of Amazon facilities that cater for the uptake in online demand. Between 2011 and 2019, e-commerce activity more than doubled from 8%

to 19% of all retail sales in the UK (ONS. 2021). Over the same period, Amazon's net sales grew by a staggering 228% from roughly 5 billion to 18 billion US dollars, making it the leading player in the UK e-commerce market and only second to Germany in terms of Amazon's European presence. The intensification of digital consumptive practices as the dominant retail paradigm in these critical years stimulated the demand for an increased physical infrastructure of warehouse space tasked with stocking online inventories, going half the way in explaining the dramatic and unrivaled growth in Amazon facilities across the globe. The Great Recession forced the focus of development away from retail, restaurants and office space and towards warehouse-based real estate. Indeed, the 2010s shall be known as the decade in which the economic tide turned in the direction of warehousing to the point at which it would surpass all other forms of non-residential construction. Between 2018 and 2019, the amount of warehouse space under construction increased by 20% from 299 million square feet to 358 million square feet, with Amazon claiming the largest stake (Vuocolo 2021) – including the platform's recently established site in Darlington.

Amazon's international outgrowth beyond the United States to select countries in Europe during a period when other firms were (often unsuccessfully) navigating their way out of a systematic crisis of financialised capitalism can be interpretated principally through the fact that the platform's Prime service has been reaching market saturation at home, where US household membership is at 65%; over 85 million members (Camhi and Pandolph 2017). Prime represents Amazon's largest vehicle of revenue extraction and avenue for long term growth. This is made apparent with the knowledge that Prime customers spend on average more ($1,300 per year) than non-members ($700 per year) (Levin and Lowitz 2017). Amazon's international strategy throughout the 2010s was therefore to expand its Prime services in countries, like India, Singapore, Brazil and Mexico, that were experiencing rapid growth in terms of e-commerce adoption as a percentage of total retail.

The platform's developmental trajectory in the UK predates these emerging trends by a decade at least. Nonetheless, Amazon had only 7 physical sites in Britain prior to 2012, suggesting that it too was part of the platform's drive in the 2010s when e-commerce was rising exponentially. Moreover, the UK – along with Germany, Japan and North America – is where 95% of Amazon's e-commerce revenues derive from, since only in these countries was the infrastructural capacity and sufficient scale established early doors so as to avoid playing 'catch up' with local competitors (Dawson 2015). The ability of the platform to reach Prime customers by clustering facilities around major population densities was therefore critical to its short-term revenues. Owing to the politics of scale, the UK is one of few countries where Amazon have periodically been able to do this.

Critically, Amazon were able to achieve this feat and expand where other logistics providers might have fallen short because of the process of 'cross-subsidisation'. According to Nick Srnicek (2017, 64-65), this tactic is leveraged in such times where market concentration is the most crucial aspect to future growth by using one arm of the firm to subsidise the price of a service elsewhere. Cross-subsidisation – deriving predominantly from Amazon Web Services (AWS), where Amazon charge a digital rent in exchange for cloud computing space (for which it dominates that market thanks to a similarly impressive and flush physical nexus of data farms) – allows Amazon to keep the cost of Prime low while it unfolds its platform power through infrastructuralisation and draws more users into its network. From there, the totalising advantages of *network effects* play out in full force, allowing for rapid growth and scaling up of territory. Given the capital-intensive nature of operating logistical spaces of distribution, the practice of cross-subsidisation was central to Amazon's North Eastern conquest in the later years of the 2010s. As online sales increased exponentially, speculative development slowed, and we witnessed the return of prime rental growth particularly for mid-box units (warehouses typically ranging from 50,000 to 100,000 sq ft) (Thame 2020), such a strategy proved indispensable to the generation of revenue in the face of a decade of stagnant growth in the British economy.

A dialectical pattern, the more frequented Amazon's online services become the more they can build out their operations in the material world, in turn optimising the very same services that draw people to the platform. This pattern, where more users beget more users, swallowing up space in the process, is a form of pseudo-monopolisation that outlines how platforms have a tendency towards monopolisation (Srnicek 2017, 45). It is the physical presence of the company in peripheral regions like Darlington, a soffit of its fulfilment network, that solidify this, and ultimately indicate that there is 'no end in sight … I mean it's years out…', as one real estate director put it, to the warehouse boom driven by Amazon's building spree (Vuocolo 2021). The precise spatial dynamics of this spree are all that are left to be unpacked, chiefly through an analysis of the construction of supply-chain infrastructure.

Priming for prime: customised infrastructural space and Amazon under construction

It takes any number of different interdependent political and business agents working at various scales of governance in an economic climate bent in their favour to engage in the act of space-making before a shovel is even put in the ground. Returning to the local then, what about when the planning permission is granted, the pre-let is agreed, the engines turn on and the concrete and steel begin to be laid over the soil?

Amazon are not unaccustomed to converting existing facilities into spaces of fulfilment, in the US going so far as to repurpose disused shopping centres (Miranda 2021). Still, the long-term trajectory of the platform looks to belong to self-developed sites in which Amazon are gifted with a blank canvas on which to scale up intricately engineered structures designed specifically for package fulfilment in an increasingly automated environment. The stretch of disused land Tritax Symmetry developed for Amazon spans 90 acres in total, 34 acres of which consists of the fulfilment centre and its ancillary infrastructure (parking, internal roads etc.), with the remainder approved for an additional 630,000 square foot warehouse along with a neo-feudal style collection of neighbouring hotels, pubs, restaurants and cafes that altogether, at an anticipated development value of around £30m, would bring an additional 700 agency-procured jobs to the region on top of the 1000+ already created (Robson 2020).

This sort of construction has been the norm since the 1990s when the fragmentation and commercialisation of regional development created an entirely new way of delivering infrastructure. As Peck (1996) demonstrates, the relationship between the public and private sphere has been inverted when it comes to influence over infrastructural projects. Infrastructure is no longer planned by local authorities and then offered to private capital. Rather, infrastructural space is increasingly customised by private capital in the planning process, making for what Peck describes as *customised infrastructural space*. As space has grown more central to capital accumulation, large investors no longer make decisions based solely on the particularities of the local labour force it can deploy as a means to control the labour process, but on account of their ability to control the physical environment as well. When it comes to locality, land is, unsurprisingly, the most important factor. Much like the shift from push to pull production that characterises flexible accumulation in the contemporary supply-chain, customised infrastructural space describes a demand-led approach to the production of space that attempts to match the specific requirements of the *end user* to broader regional development objectives (Peck 1996, 331).

Construction of an Amazon warehouse entails an intense ground operation that inevitably runs up against a variety of hurdles owing to time sensitivity, coordination interdependence and labour shortages. Developers synchronise multiple processes that must happen in rapid succession, factoring in time delays from contractors that are often as unpredictable as they are unavoidable. Ironically, building a distribution warehouse presents its own logistical challenges that demand the use of *just-in-time* construction logistics solutions of 'total-cost analysis'

(Cowen 2014, 34). As Janné (2018, iii) writes, because the end products of construction projects are produced at their place of consumption, transport flows must be erected in urban areas that facilitate the delivery and removal of a multitude of materials and resources which, being subject to spatial limitations and environmental demands, require intense coordination and management to reduce their impact on urban transport systems whilst maintaining the efficiency of the project as a whole.

Evidently, whilst a fundamentally global trend, the scaling up of architectural structures of fulfilment comes up against the friction embedded in local flows of materials and people. Watching a time-lapse of the assembly of Amazon's Verdion iPort fulfilment centre in Doncaster in 2016 (Verdion 2017), one accepts the degree to which construction pivots on a dynamic and uninterrupted flow of cranes, diggers, rollers, concrete mixer trucks, cherry pickers, lorries, vans, cars, tractors etc. in a choreographed symphony, all acting as separate entities yet dependent on one another in the service of a greater force. In Darlington, the lean arrangement of transport flowing to and from the Symmetry Park construction site would have enabled spatial planners and supply-chain managers to put Darlington's peripheral infrastructure to the test for the first time, with trucks carrying asphalt mimicking the inbound freight of pallet loads of consumer goods that would soon become a daily reality.

When it comes to the act of construction itself, the majority of developments will involve the use of diggers to move soil materials in preparation for rudimentary priming techniques like aggregate base coursing, concrete curbing, and hot mix paving. Even the preceding process of 'staking out' the land demands precision, like soil samples gathered for geological and environmental considerations or post-construction assessments to analyse for potential contamination. These practices once again remind us of the horizontal value of the ground to the production of spaces of flow. Lyster (2016, 157-67) makes clear that where conventional architecture has suppressed the ground as background fodder, the architectural shells of logistical spaces render 'ground thinking' as the de-facto space where developing conditions of urbanisation could play out; a 'catalyst hosting the critical systems of a city from drainage to hydrological and information flows'. Nowhere is this more apparent than with the fulfilment centre. In so-called 'advanced robotic' sorting sites that are the norm for current and future developments, the ground is the dominant feature and the primary experience of space, supported by structural mezzanine floors. Cameras attached to Automated Guided Vehicles (AGVs) read barcodes disseminated on the warehouse floor, whisking the AGVs along the surface at a low centre of gravity via a navigational grid of magnetic strips. Even in sites where labour performs a slightly less subservient role (insofar as they are not decked out with the same levels of tech) walking up to ten miles a day to locate items from pods for picking, tracking software used by 'pickers' digitally fixes their position onto peel-and-stick barcodes layering the floor surface, feeding this information back to computers that map workers' position in real-time (Lyster 2016, 158-62). These critical operations around which the pursuit of mobility and flow balance stress the need for developers to see nature as an artificial product in conquering it, recognising the *ground as subject* in terraforming it.

To further advance the primacy of flow in the infrastructural regime of modern logistics, consider also that such infrastructures are seldom confined to the four walls of a single distribution facility. Logistics infrastructuralisation implicates everything in its path, be that the building of surrounding roads and roundabouts as physical linkages, or the installation of optical fibres as digital chains. This was evidenced in 2019 when the development in Darlington was met by hostility from locals after an agreement struck between Amazon and Virgin Media to dig up roads and pavements in one of the surrounding areas, Hundens Lane, to fit internet lines caused everyday disruption for several months (2019b). Clearly, when landscapes become integrated as modular components within much larger networks that are designed to serve functions that far surpass their regional and geographical proximity, transformations occur on levels that equally cannot be said to exist within the confines of the designs of those networks.

When examining the transport networks and link roads that surround Amazon's Darlington facility it becomes even clearer yet that infrastructuralisation is unremitting; its expansionary logic quickly demands more of the built environment to cater for the uptake in freight traffic flowing to and from the site. Such is part of the impetus behind plans by the Tees Valley Mayor for a new 'Darlington Northern Link Road' outlined in November of 2020, a progression of the *Tees Valley Combined Authority Tees Valley Strategic Economic Plan (2016-2026)*. The preferred route (one of three) proposes a single carriageway road beginning from a newly formed large roundabout at Little Burton off the A1150, running over the River Skeme before slicing north through greenfield like a knife via the north east of Brampton and Brafferton, eventually linking up with the A1(M) Junction 59 north of the river.

What these proposals indicate is that the catalyst driving the spatial development of local regions increasingly bends towards the infrastructures of contemporary B2C logistics, themselves a spatial phenomenon that arises in the wake of the collapse of the Fordist city. In the process, local areas become appendages to greater economic networks of mobility, *spaces of flow* that dictate how we mould the physical world around us: logisticalise or die. At the time of writing, Amazon are busy solidifying their value chains in the North East. Encouraged by the Northern Link Road, the platform is in talks (along with several other companies) with the Mayor of Tees Valley to convert 270 million acres of disused land on the southside of Teesside Airport into a business park that would include two million square feet of logistics, distribution and industrial buildings to link up commodity flows from other countries directly to the region. Adding an international pathway to its fulfilment network would grant Amazon the capacity to receive and send parcels from other countries directly through the North East of England. This will be accompanied by plans that are already underway for an access road between the airport and the A67, further strengthening Teesside's logistics network and enabling the Mayor's ambitions to make Teesside Airport the 'number one centre for cargo and freight in the North of England' (Scott 2021).

We ought to understand the construction of a single warehouse like nesting behaviour amongst bees: once they have firmly settled on a location, bees *build out* their colonies, using heat to cause the cell walls of combs to melt, thereby flattening them together to form hexagons that optimise space for the storage of honey. Distribution networks are not nearly as centralised, but nonetheless trigger a multiplier effect once a connection to a place has been established, fashioning link roads to fold the different nodes into one another in smoothing out space for faster circulation. One expects this to only be the start of Amazon's fulfilment network in the North East as it gradually becomes England's equivalent to the Interporto of Italy or the Inland Empire of the United States.

Discussion

Amazon is fast becoming a permanent part of our imaginary. It is relatively common today, amidst the endless *search for stuff*, to be met with the question 'have you Amazoned it?' For Amazon to be so universal that it has managed to implant itself into the lexicon of our times, it must first rule the roost over the landscape. As simple as it sounds, you cannot have the 'everything store' without storing everything, everywhere, all of the time. Far from being an immaterial phenomenon, as the ontology of the digital economy might let on, convenience of this magnitude comes at a cost that is as spatially demanding as it is demanding on waged labourers, therefore the quicker and slicker these supply-chains the more control they command over the built environment as well as human energy. Specially engineered spaces of distribution are the fulcrum of rapid delivery turnovers, and thus become the subject of much attention and speculation from planners and architects. But as Easterling (2016, 188-9) reminds us, it is not the latter group that devises the rules of this spatial game, their utopian visions being 'no

match for the plodding bureaucracies of standard making'. Rather, pure infrastructural functionality has come to stand in for architecture, subordinating design to its logic and emptying architecture of its aesthetic, transcendent character. In fact it may often feel as if towns and cities transform at a pace and will of no one individual, not least for those who reside there. The purpose of transformation, however, remains clear: capital, being value-in-motion, needs assistance at the level of infrastructure space to weld together value chains that guarantee its exceptionally fast realisation and reproduction. Amazon's fulfilment network is indicative of this unfolding process.

Living near an Amazon warehouse, one's senses are polluted in two ways: via noise and air pollution through the constant growl of moving engines and the fumes those engines emit, and, in the more profound sense, via the pollution of our perceptions as the combination of digital and physical infrastructures render buying online insensible beyond the geography of the screen (Hill 2020, 532). As an urban form, this is one of *infrastructure as architecture*. The point of Amazon, or any platform for that matter, is to become an immovable part of our everyday lives. Companies and people engage in exchange to benefit from Amazon's advanced infrastructure; in turn the fees paid by these customers help to support the cost of that infrastructure (Cronin 2014, 56). This is essentially what construction company Sergo's chief executive David Sleath meant when he said recently, responding to a question about what their soulless big-box architecture does to the countryside, that 'ultimately the consumer decides what gets built … what we are doing is trying to facilitate that: we're very thoughtful about what we build and where we build it' (Partridge 2021). The consumer, compelled by the need to fulfil their desires through ubiquitous consumption, tacitly give the green light for new construction projects to facilitate it. Naked functionality, that is, infrastructure space, is now the predominant method of spatial thinking that architects must adjust to.

There is a comparison to be made here with the reorganisation of digital space. As Cronin (2014, 49) highlights, Amazon's website in 1995 is a far cry from what we are familiar with today. Sellers had more autonomy to make their own design choices about how to illustrate products and 'often such decisions were based on the aesthetic of the site designer'. This all changed when developers acknowledged a need to engineer interfaces for specific ends like data mining, visitor engagement, and the best way to manage the checkout process so that customers do not abandon their online shopping carts. Albeit over a vastly superior stretch of time, much the same process has occurred in the realm of architectural space. The preoccupation with aesthetics was abandoned in favour of thinking through spatial design in a functional manner that prioritised the three great variables of territory, communication and speed (Foucault and Rabinow 1984, 244). This elevated a new segment of the ruling class to advance the ruling ideas of the epoch, as Marx and Engels (2022, 35) would have it.

Today that epoch belongs to Amazon, who transcend national sovereignty in shaping entire regions in the image of a society in which the world is brought to us rather than bringing us to the world (Virilio 2000). Creating a world in which there is no physical, mental or democratic buffer between a transnational corporation and a local community, no matter how remote, is the aim, and logisticalisation is the method. The more tendrils Amazon extends into infrastructure of local terrains, the more it can enhance its competitive advantage through minimising (or even diminishing) its reliance on third-party delivery companies, taking the platform one step closer to overseeing the total organisation of all the world's physical commodities (Hill 2020, 4). Amazon may soon own the very equipment used by manufacturers who supply components for the construction of Amazon fulfilment centres – total-cost logistics taken to the extreme. Vertical integration on this scale requires supply-chain power only found in companies with hefty capital investment in computing and logistics infrastructure. Amazon's Darlington ingress provides us with a look-in regarding how this process is materially prepared by the horizontality of supply-chain infrastructure as architecture.

Conclusion

In several decades' time, we may look at the scale of Amazon's physical territory around the globe as if it were part of the furniture, impenetrable infrastructure to any town, city or place connected to a global, post-architectural world of landscape urbanism (Waldheim 2016). This article has sought to disrupt this settling sense of inscrutability. It began with an exploration of Amazon's UK fulfilment network, registering the geographical logic of distribution that amplified an urban corridor of logistics clusters in the East Midlands. In recognising the limitations of the Golden Triangle of logistics in terms of both its capacity and being at odds with the contemporary 'pull' pressures of B2C e-commerce logistics, it then conceived of the North East as part of Amazon's pursuit of the guarantee of instantaneous consumption – consumption made possible by last-mile infrastructuralisation. Here it engaged with the specifics that brought Amazon to Darlington, including the locational pull of Link 66 and its rurban character, the business actors involved and their interests, and the planning history of the land and its journey through time, before situating this incursion in the post-Crash economy. Superimposing the global onto the local allowed for an understanding of Amazon as a platform that can be responsible for both the future trajectory of the entire industry of e-commerce (and its many consequences) and the electrical work on Hundens Lane in Darlington. This paved the way for a final discussion of Amazon as a thoroughly material entity, one that seeks to sink itself into local areas so as to operate as customised infrastructural space that has monopoly rule over spatial production. It provided a means to demystify Amazon from its digital ontology by chronicling it through the elements – soil, concrete, copper, and the like. Amazon assumes a physical form when it seeks to stitch localities into its fulfilment network, deploying *just-in-time* construction logistics to dominate nature and exploit the ground in the pursuit of mobility.

In forging another local node in a transnational logistics and information network, Amazon moves one step to closer to infrastructural singularity.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Anim-Addo, A., W. Hasty, and K. Peters. 2014. "The Mobilities of Ships and Shipped Mobilities." *Mobilities* 9 (3): 337–349. https://doi.org/10.1080/17450101.2014.946773.

Arboleda, M. 2020. *Planetary Mine: Territories of Extraction under Late Capitalism*. London: Verso.

Attewell, W. 2021. "Just-in-Time Imperialism: The Logistics Revolution and the Vietnam War." *Annals of the American Association of Geographers* 111 (5): 1329–1345. https://doi.org/10.1080/24694452.2020.1813540.

Bonacich, E., and J. B. Wilson. 2008. *Getting the Goods: Ports, Labor and the Logistics Revolution*. London: Cornell University Press.

Bratton, B. 2015. *The Stack: On Software and Sovereignty*. Cambridge, MA: MIT Press.

Brenner, N. 1998. "Between Fixity and Motion: Accumulation, Territorial Organization and the Historical Geography of Spatial Scales." *Environment and Planning D: Society and Space* 16 (4): 459–481. https://doi.org/10.1068/d160459.

Camhi, J., and S. Pandolph. 2017. "Amazon Prime Subscribers Hit 80 million". *Business Insider*. https://www.businessinsider.com/amazons-earnings-point-to-international-expansion-2017-5?r=US&IR=T

Castree, N. 2009. "The Spatio-Temporality of Capitalism." *Time & Society* 18 (1): 26–61. https://doi.org/10.1177/0961463X08099942.

Chapman, K. 2005. "From 'Growth Centre' to 'Cluster': Restructuring, Regional Development, and the Teesside Chemical Industry." *Environment and Planning A: Economy and Space* 37 (4): 597–615. https://doi.org/10.1068/a36270.

Chua, C. 2019. "Logistics." In *The Sage Handbook of Marxism*, edited by S. Farris, A. Toscano, and B. Skeggs, 1–27. London: Sage Publications.

Cidell, J. 2015. "Distribution Centers as Distributed Places: Mobility, Infrastructure and Truck Traffic." In *Cargomobilities: Moving Materials in a Global Age*, edited by T. Birtchnell, S. Savitzky and J. Urry, 17–34. Hoboken, NJ: Taylor and Francis.

Cowen, D. 2014. *The Deadly Life of Logistics: Mapping Violence in Global Trade*. Minneapolis, MN: University of Minnesota Press.
Cronin, M. 2014. *Top Down Innovation*. New York, NY: Springer.
Cuppini, N. 2017. "Dissolving Bologna: Tensions between Citizenship and the Logistics City." *Citizenship Studies* 21 (4): 495–507. https://doi.org/10.1080/13621025.2017.1307608.
Danyluk, M. 2018. "Capital's Logistical Fix: Accumulation, Globalization, and the Survival of Capitalism." *Environment and Planning D: Society and Space* 36 (4): 630–647. https://doi.org/10.1177/0263775817703663.
Darlington Borough Council. 2016. *Darlington Borough Draft Local Plan 2016-2036 Consultation Draft June 2018*. https://darlington.objective.co.uk/events/32655/4876541_accessible.pdf
Dawson, J. 2015. "Amazon's International Growth Challenge". *Tech.pinions*. https://techpinions.com/amazons-international-growth-challenge/40044
De Silva, C. K., K. Sano, and K. Hatoyama. 2020. "Exploring the Relationship between Urban Form and Spatial Organisation of Amazon Fulfilment Facilities in the United Kingdom and Japan." *Transportation Research Procedia* 46: 149–156. https://doi.org/10.1016/j.trpro.2020.03.175.
Delfmann, W., W. Dangelmaier, W. Günthner, P. Klaus, L. Overmeyer, W. Rothengatter, J. Weber, and J. Zentes. 2010. "Towards a Science of Logistics: Cornerstones of a Framework of Understanding of Logistics as an Academic Discipline." *Logistics Research* 2 (2): 57–63. https://doi.org/10.1007/s12159-010-0034-5.
Dodd, A. 2022. "700 Jobs Could Come to Industrial Park Next to Amazon Darlington". *The Northern Echo*. https://www.thenorthernecho.co.uk/news/19911404.700-jobs-come-industrial-park-next-amazon-darlington/?fbclid=IwAR18sVWB8kje54BrhzvoqTsoWHqPjEt8WyOYQMM1bjZJlakI9l-0HBncjnM
Easterling, K. 2004. "The New Orgman: Logistics as an Organising Principle of Contemporary Cities." In *The Cyber Cities Reader*, edited by S. Graham, 179–184. London: Routledge.
Easterling, K. 2016. *Extrastatecraft: The Power of Infrastructure Space*. London: Verso.
Foucault, M., and P. Rabinow. 1984. *The Foucault Reader*. New York, NY: Pantheon Books.
Gullon, N. 2018. "Business Park Hailed as 'Game Changer' for Town." *Darlington & Stockton Times* March 9, 2018.
Hannam, K., M. Sheller, and J. Urry. 2006. "Editorial: Mobilities, Immobilities and Moorings." *Mobilities* 1 (1): 1–22. https://doi.org/10.1080/17450100500489189.
Harvey, D. 1985a. *The Urbanisation of Capital*. Oxford: Blackwell.
Harvey, D. 1985b. "The Geopolitics of Capitalism." In: D. Gregory and J. Urry (eds.) *Social Relations and Spatial Structures*. London: Macmillan. 128–163.
Harvey, D. 1989. *The Condition of Postmodernity*. Oxford: Blackwell Press.
Harvey, D. 2018. *The Limits to Capital*. London: Verso.
Hendrix, J. S. 2006. *Architecture and Psychoanalysis: Peter Eisenman and Jacques Lacan*. New York: Peter Lang.
Hetherington, G. 2018. "Amazon Darlington Deal Takes Another Step Forward". *The Northern Echo*. https://www.thenorthernecho.co.uk/news/16323024.amazon-darlington-deal-takes-another-step-forward/
Hill, D. W. 2020. "The Injuries of Platform Logistics." *Media, Culture & Society* 42 (4): 521–536. https://doi.org/10.1177/0163443719861840.
Hill, D. W., and D. Martin. 2017. "Visibly Mute: Ethical Sociality and the Everyday Exurban." *Antipode* 49 (2): 416–436. https://doi.org/10.1111/anti.12271.
Janné, M. 2018. *Linköping Studies in Science and Technology: Construction Logistics Solutions in Urban Areas*. Norrköping: Linköping University.
Kaori Gurley, L. 2022. "Amazon Has Received $4.7 Billion in Subsidies Globally, Watchdog Says". *Motherboard Tech by Vice*. https://www.vice.com/en/article/jgmvk8/amazon-has-received-at-least-dollar47-billion-in-subsidies-globally-watchdog-says
Langlois, G., and G. Elmer. 2019. "Impersonal Subjectivation from Platforms to Infrastructures." *Media, Culture & Society* 41 (2): 236–251. https://doi.org/10.1177/0163443718818374.
Lefebvre, H. 1991. *The Production of Space*. Malden, MA: Blackwell.
Levin, M., and J. Lowitz. 2017. "Amazon Prime Hits 90 Million US Members: As Growth Reaches Limits, Almost All Members Intend to Renew". *Chicago: Consumer Intelligence Research Partners*. http://files.constantcontact.com/150f9af2201/d8e982eb-fcc7-41b4-bd58-eba64185962d.pdf
Lewis, E. 2005. *Great IKEA: A Brand for All People*. London: Cyan Books.
Lupton, K. 2018. "Is The 'Golden Triangle' Still the Centre of UK Logistics?" *Bis Henderson Space*. https://www.bis-hendersonspace.com/is-the-golden-triangle-still-the-centre-of-uk-logistics/
Lyster, C. 2016. *Learning from Logistics: How Networks Change Our Cities*. Berlin: Birkhäuser.
Martin, D. 2008. "The Post-City Being Prepared on the Site of the Ex-City." *City* 12 (3): 372–382. https://doi.org/10.1080/13604810802479001.
Marx, K. 1973. *Grundrisse*. Harmondsworth, Middx: Penguin Books.
Marx, K., and F. Engels. 2022. *The German Ideology*. Paris: Foreign Language Presses.
Massey, D. 1980. "The Pattern of Landownership and its Implications for Policy." *Built Environment* 6 (4): 263–271.
Miranda, L. 2021. "Amazon is Snapping Up Disused Shopping Malls and Turning them into Fulfillment Centers." *NBC News*. https://www.nbcnews.com/business/business-news/amazon-snapping-disused-shopping-malls-turning-them-fulfillment-centers-n1262914

Neilson, B. 2012. "Five Theses on Understanding Logistics as Power." *Distinktion: Journal of Social Theory* 13 (3): 322–339. https://doi.org/10.1080/1600910X.2012.728533.
Newsome, K. 2010. "Work and Employment in Distribution and Exchange: Moments in the Circuit of Capital." *Industrial Relations Journal* 41 (3): 190–205. https://doi.org/10.1111/j.1468-2338.2010.00563.x.
ONS. 2021. "Internet Sales as a Percentage of Total Retail Sales (ratio) (%)". *Retail Sales Index Time Series (DRSI)*. https://www.ons.gov.uk/businessindustryandtrade/retailindustry/timeseries/j4mc/drsi
ONS. 2022. "The Rise of the UK Warehouse and the "Golden Logistics Triangle"." *Office for National Statistics*. https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/articles/theriseoftheukwarehouseandthegoldenlogisticstriangle/2022-04-11
Orenstein, D. 2019. *Out of Stock: The Warehouse in the History of Capitalism*. Chicago: University of Chicago Press.
Partridge, J. 2021. "Interview: David Sleath: The Man who Builds Warehouses for Amazon". *The Guardian*. https://www.theguardian.com/business/2021/nov/27/david-sleath-the-man-who-builds-warehouses-for-amazon
Peck, F. W. 1996. "Regional Development and the Production of Space: The Role of Infrastructure in the Attraction of New Inward Investment." *Environment and Planning A: Economy and Space* 28 (2): 327–339. https://doi.org/10.1068/a280327.
Plantin, J.-C., C. Lagoze, P. N. Edwards, and C. Sandvig. 2018. "Infrastructure Studies meet Platform Studies in the Age of Google and Facebook." *New Media & Society* 20 (1): 293–310. https://doi.org/10.1177/1461444816661553.
Robson, D. 2020. "700 Jobs in Warehouse, Pub and Hotel Plan near Amazon Darlington". *TeessideLive*. https://www.gazettelive.co.uk/news/teesside-news/huge-scheme-near-amazon-darlington-17971127
Sassen, S. 2006. *Territory, Authority, Rights: From Medieval to Global Assemblages*. Princeton, NJ: Princeton University Press.
Savills 2018. "Big Shed Briefing. Savills World Research: UK Logistics". *Savills*. https://pdf.euro.savills.co.uk/uk/commercial--other/big-shed-briefing—january-2018.pdf
Scott, J. 2020. "Amazon's First Fulfilment Centre in the North-East Officially Opens in Darlington". *The Northern Echo*. https://www.thenorthernecho.co.uk/news/18440030.amazons-first-fulfilment-centre-north-east-officially-opens-darlington/
Scott, J. 2021. "Amazon 'In Talks' over New Logistics Site at Teesside Airport". *The Northern Echo*. https://www.thenorthernecho.co.uk/news/19755543.amazon-in-talks-new-logistics-site-teesside-airport/
Scott, J. 2022. "Amazon's New Teesside Warehouse in Wynyard Almost Finished". *The Northern Echo*. https://www.thenorthernecho.co.uk/news/23134417.amazons-new-teesside-warehouse-wynyard-almost-finished/
Semuels, A. 2018. "What Amazon Does to Poor Cities". *The Atlantic*. https://www.theatlantic.com/business/archive/2018/02/amazon-warehouses-poor-cities/552020/
Sheffi, Y. 2012. *Logistics Clusters: Delivering Value and Driving Growth*. London: The MIT Press.
Sheller, M., and J. Urry. 2006. "The New Mobilities Paradigm." *Environment and Planning A: Economy and Space* 38 (2): 207–226. https://doi.org/10.1068/a37268.
Smith, N. 1984. *Uneven Development: Nature, Capital, and the Production of Space*. London: Verso.
Soja, E. 1989. *Postmodern Geographies: The Reassertion of Space in Critical Social Theory*. London: Verso.
Srnicek, N. 2017. *Platform Capitalism*. Cambridge: Polity Press.
Steinberg, P. E. 2015. "Maritime Cargomobilities: The Impossibilities of Representation." In *Cargomobilities: Moving Materials in a Global Age*, edited by T. Birtchnell, S. Savitzky and J. Urry, 35–47. Hoboken, NJ.: Taylor and Francis.
Tenekeci, G. 2020. "Freight for Trade: Do We Have Enough Data to Analyse?" *European Transport Conference 2020*. https://trid.trb.org/view/1769370
Thame, D. 2020. "Amazon Accounts for a Third of UK Warehouse Floorspace Let this Summer". *SHD Logistics*. https://www.shdlogistics.com/amazon/amazon-accounts-third-uk-warehouse-floorspace-let-summer
Verdion. 2017. "Verdion iPort Time Lapse Amazon Movie." *YouTube*. https://www.youtube.com/watch?v=dU9_dNtiUEw
Virilio, P. 2000. *The Information Bomb*. London: Verso.
Virilio, P. 2006. *Speed and Politics*. Translated by M. Polizzatti. New York: Semiotext(e).
Vuocolo, A. 2021. "Amazon, E-Commerce Drive Boom in Warehouse Construction". *Cheddar News*. https://cheddar.com/media/amazon-ecommerce-drive-boom-in-warehouse-construction
Waldheim, C. 2016. *Landscape as Urbanism*. Princeton, NJ: Princeton University Press.
Wallace-Stephens, F., and A. Lockey. 2019. "Retail Therapy: Towards a Future of Good Work in Retail." *RSA Action and Research Centre*. https://www.thersa.org/globalassets/pdfs/reports/retailtherapy.pdf
Wilmore, J. 2018. "Amazon: 5 Ways It Will Change the Construction Market". *Construction News*. https://www.constructionnews.co.uk/archive/amazon-5-ways-it-will-change-the-construction-market-08-05-2018/