



**From automobile capitalism to platform capitalism:
Toyotism as a prehistory of digital platforms**

Journal:	<i>Organization Studies</i>
Manuscript ID	OS-19-0623.R3
Manuscript Type:	Special Issue on Technology and Organization
Keywords:	platform capitalism, automobile industry, platform history, Toyotism, media theory, management theory, Japan
Abstract:	This article explores the automotive lineage and manufacturing origins of platforms. Challenging prevailing assumptions that the platform is a digital artefact, and platform capitalism a new era, this article traces crucial elements of platform capitalism to Toyotist automobile manufacture in order to rethink the relationship between technology and organization. Arguing that the very terminology and industry applications of the 'platform' emerge from the automobile industry over the course of

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

	<p>the 20th century, this article cautions against the uncritical adoption of epochal paradigms, or assumptions that new technologies require new organizational forms. By parsing the platform into two types, the stack and the intermediary, this article demonstrates how the platform concept and data-driven production practice both develop out of the Toyota Production System in particular, and American and Japanese analyses of it. Toyotism, we show, is the unseen industrial and epistemological background against which the platform economy plays out. In making this case, this article highlights the crucial continuities between the data intensive production of companies like Uber and Amazon – emblematic of digital platform capitalism – and the organizational paradigms of the automobile industry. At a moment when the automobile returns to prominence amidst platforms such as Uber, Didi Chuxing, or Waymo, and as we find tech companies turning to automobile manufacturing, this automotive lineage of the platform offers a crucial reminder of the automotive origins of what we now call platform capitalism.</p>

SCHOLARONE™
Manuscripts

Title

From automobile capitalism to platform capitalism: Toyotism as a prehistory of digital platforms

Author

Marc Steinberg
Concordia University, Canada

Abstract

This article explores the automotive lineage and manufacturing origins of platforms. Challenging prevailing assumptions that the platform is a digital artefact, and platform capitalism a new era, this article traces crucial elements of platform capitalism to Toyotist automobile manufacture in order to rethink the relationship between technology and organization. Arguing that the very terminology and industry applications of the ‘platform’ emerge from the automobile industry over the course of the 20th century, this article cautions against the uncritical adoption of epochal paradigms, or assumptions that new technologies require new organizational forms. By parsing the platform into two types, the stack and the intermediary, this article demonstrates how the platform concept and data-driven production practice both develop out of the Toyota Production System in particular, and American and Japanese analyses of it. Toyotism, we show, is the unseen industrial and epistemological background against which the platform economy plays out. In making this case, this article highlights the crucial continuities between the data intensive production of companies like Uber and Amazon – emblematic of digital platform capitalism – and the organizational paradigms of the automobile industry. At a moment when the automobile returns to prominence amidst platforms such as Uber, Didi Chuxing, or Waymo, and as we find tech companies turning to automobile manufacturing, this automotive lineage of the platform offers a crucial reminder of the automotive origins of what we now call platform capitalism.

Keywords

platform capitalism, automobile industry, platform history, Toyotism, media theory, management theory, Japan

Corresponding author

Marc Steinberg, Mel Hoppenheim School of Cinema, Concordia University, 1455 de
Maisonneuve Blvd. West, Montreal, Quebec, Canada, H3G 1M8. Email:
marc.steinberg@concordia.ca

Introduction

Imagine a familiar scene: a ride-seeker takes out their smartphone, opens the Uber app, and orders a ride. A few minutes later, an Uber driver picks up a passenger in a Toyota Prius, driving them to their destination. Guided by a data-driven app and set of algorithms that map the optimal route, manage the driver's performance, and extract data about the destination, Uber is the iconic image of the disruptive, asset-light tech firm driven by digital intermediary technologies and multiple rounds of venture capital financing that is the model of platform capitalism today (Srnicsek, 2016). Uber and companies like it have become the face of 'platforms' today and their controversial social impacts. Yet what we neglect in this scenario is not the driver—increasingly acknowledged as an employee deserving of benefits with the company described as a 'platform labour intermediary' (Doorn, 2017)—but rather the manufactured object of the automobile itself, the Toyota Prius. Built using lean manufacturing methods, just-in-time production, consumer data collection that feeds back into production, and variation combined with standardization, this car is the overlooked base of this platform economy and its organizational logics, literally and historically speaking.

The car is, and remains, the star of the platform economy. It is the oft-forgotten predecessor of the digital platform in its industrial and theoretical manifestations. As smartphone makers seek to get into electric vehicle production—including Apple supplier Foxconn—the automobile lineage of platform capitalism demands our attention. Drawing attention to this automobile lineage of the platform economy allows us to address two often unspoken claims made in recent literature on the platform: (1) that the platform is essentially a new technological and organizational form; and (2) that the platform is essentially digital in nature (ex.:

Andressen, 2007; Bogost & Montfort, 2009; Davis, 2016; Kenney & Zysman, 2016; Srnicsek,

1
2
3 2016). To rephrase these claims as research questions, we should ask: (a) is the platform
4 essentially new, and therefore productive of new organizational forms?; (b) is the platform
5 essentially digital?; and (c) if the answer to both is “no” then what do organization studies,
6
7
8
9
10 technology studies, and media studies miss by treating platforms as both new and essentially
11
12 digital? In response to this special issue on the intimate relationship between organization and
13
14 technology, this article traces the automobile lineage of the platform with a primary aim of
15
16 forestalling assumptions of immediate organizational change corresponding to the rise of
17
18 purportedly new technological forms like the platform; and with a secondary aim of prompting a
19
20 deeper consideration of the non-deterministic relation of discursive and industrial practices to
21
22 technologies and organizational forms.
23
24
25

26
27 Media studies scholars have noted the danger of taking platforms at face value. As Hoof
28
29 and Boell caution, “platform” has to be seen as an already value-laden description fostering
30
31 certain managerial and economic interests’ (2019, p. 246). If skepticism about YouTube’s claims
32
33 to being a platform, for example, means we should regulate it like a media company or television
34
35 broadcaster (Napoli & Caplan, 2017), what are the consequences of arguing that platform
36
37 capitalism is much more like automobile capitalism than we care to recognize? Following an
38
39 exposition of the literature on platforms (including attention to platform capitalism and platform
40
41 organization), and an explanation of research results that show the automobile industry and
42
43 theories around it are the basis for current digital platform theories, the discussion section will
44
45 consider the consequences of taking this automobile lineage of platform capitalism seriously.
46
47
48
49
50

51 **From Platforms to Platform Capitalism**

52
53
54
55
56
57
58
59
60

1
2
3 *Platform* has become one of the dominant media concepts, organizational paradigms, and
4 corporate bywords of our era. The imperialistic advance of the term in claiming increasingly
5 large swaths of industry, culture, and life around the world points to the terminological porosity
6 of platform as term. In digital cultures analysis, *network* as a keyword was pushed aside by
7 *platform* around 2016, according to media theorist Geert Lovink (Lovink & Apprich, 2017, p.
8 xiv), the very same year *Organization Studies* had a special issue examining ‘The
9 Transformative Power of Network Dynamics’ and ‘the network form of organization.’ As the
10 editors of the special issue argue, the network as concept and analytic had a profound impact on
11 organization studies since the 1980s. Given current trends, *platform* will likely occupy a similar
12 role to *network* in years to come. A thorough consideration of the term is hence in order.
13
14
15
16
17
18
19
20
21
22
23
24
25

26 Thus far the field of organization studies has treated the polyvalent term platform as self-
27 evident—notwithstanding important exceptions (Alaimo & Kallinikos, 2020; Gawer & Phillips,
28 2013)—and has not accounted for its longer history within organization studies itself. As Alaimo
29 and Kallinikos (2020, p. 19) point out, ‘platforms remain badly understood as organizations,’ and
30 the field could benefit from some of the skepticism the term receives in media and technology
31 studies. Media studies (notwithstanding Nakamura, 2014; Qiu, Gregg, & Crawford, 2014), on the
32 other hand, tends to treat platforms as uniquely digital and could equally benefit from an
33 organization studies approach that accounts for the analogue history of platforms and the
34 continuities in organizational forms and managerial practices which this article highlights.
35
36
37
38
39
40
41
42
43
44
45
46

47 While sympathetic to claims that media technologies impact organizational forms—such
48 that ‘[c]ontemporary forms of organizing, such as virtual teams, just-in-time, or crowd sourcing
49 are virtually impossible without ICT, underlining that media technology forms the very
50 epistemology of communication’ (Hoof & Boell, 2019, p. 637) or Alaimo and Kallinikos’s
51
52
53
54
55
56
57
58
59
60

1
2
3 provocative (and, as they acknowledge, hyperbolic) claim the ‘the technology is the
4 organization’ (2020, p. 18)—this article urges caution in assuming one-to-one correspondences
5
6 between technology and organization. For instance: just-in-time production and the teams model
7
8 arose from Toyota’s managerial innovations rather than media-technological ones (Liu, 2004).
9
10 True, these innovations spawned media forms, such as the simple paper *kanban* card that
11
12 supported just-in-time production (Andrijasevic, Chen, Gregg, & Steinberg, 2021). But rather
13
14 than ICTs and digital platforms we should refocus our gaze on the automobile and its assembly
15
16 line. Doing so makes evident that organizational practices bleed across technological shifts; and
17
18 technological shifts don’t necessarily prompt change in organizational practices. The analogue,
19
20 automobile lineage of the digital platform brings these continuities to light.
21
22
23
24
25
26
27

28 ***Two Models of the Platform Concept***

29
30 Tracing this longer lineage of the platform requires a robust understanding of the term.
31
32 The platform concept can be broadly parsed into two main variants: the layered *stack* model; and
33
34 the horizontal *intermediary* model.
35
36

37
38 The stack refers to the layered model of the platform, often associated with computing
39
40 (Bratton, 2016). Gillespie (2010) and others have traced this to the architectural definition of the
41
42 platform as something upon which one stands. The usage is as present in media studies as it is in
43
44 organization studies; the term refers to hardware such as the IBM 360 or the Intel chip as
45
46 platform (Bresnahan & Greenstein, 1999; Gawer & Cusumano, 2002), to software like Java, to
47
48 websites like Wikipedia (Aaltonen & Lanzara, 2015), social media sites like YouTube, Facebook
49
50 or Twitter (Beverungen, Böhm, & Land, 2015; Gillespie, 2010), or music services like Last.fm
51
52
53
54
55
56
57
58
59
60

1
2
3 (Alaimo & Kallinikos, 2020). In computing one layer is built upon another; in social media one
4 posts something *on* the platforms in question.
5
6

7
8 One finds this stack model within many definitions of the platform. Michael Cusumano, a
9 crucial figure in this automobile lineage of platforms, refers to this as the ‘product platform’:
10
11

12 The term ‘platform’ first came into wide usage in the management field as a word
13 meaning foundation of components around which an organization creates a related but
14 different set of products (or services). Toyota’s Corolla sedan, Celica sports car, Matrix
15 hatchback, and Rav-4 sports utility vehicle are different products built in separate
16 projects. But they share the same underbody as well as other essential components such
17 as the engine. (Cusumano, 2010, p. 23)¹
18
19
20
21
22
23
24
25
26

27 In their overview of platform literature in business studies, Negoro and Ajiro refer to this model
28 as a ‘core technology that is common to many digital products, such as display technology, the
29 chassis in cars, printed circuits in AV equipment, etc’ (2012, p. 5). This definition aligns with a
30 similar one by Gawer and Phillips, wherein the platform is ‘a core technological building block
31 upon which organizations build complementary technologies, products or technologies’ (2013, p.
32 1063). Bratton (2016, p. xviii), for his part, describes the stack as a ‘modular and interdependent
33 vertical order’ and ‘a kind of platform that also happens to be structured through vertical
34 interoperable layers’ (Bratton, 2016, p. 52). In what follows I take the stack as one of the earliest
35 industrial models of the platform, particularly in its automotive form.
36
37
38
39
40
41
42
43
44
45
46

47
48 As Cusumano suggests above, one of the crucial referents of the stack model of the
49 platform is in fact the automobile chassis, known as the *platform*. The use of a base platform for
50 multiple car models is a practice that conjoins base-level standardization with maximal second-
51 level variation (De Vaujany, Leclercq-Vandelannoitte, & Holt, 2019). Baldwin and Clark’s
52
53
54
55
56
57
58
59
60

1
2
3 (2003, p. 151–152) important work on modularity in the computer industry similarly traces these
4 principles to automobile manufacture. Hence while the term stack may be most associated with
5
6 computing, I resituate this usage in relationship to the automobile.
7
8
9

10 The second variant on the platform concept is the intermediary model. Unlike the layered
11 model, this is a horizontal model of the platform as mediatory device enabling third party
12 transactions to take place. The credit card is one of its models (Rochet & Tirole, 2003), and
13
14 AirBnB and Uber are extensions of this model, operating as intermediaries between room hosts
15 and renters, or drivers and riders, creating multisided markets (Parker & Van Alstyne, 2005).
16
17 Most economics literature on platforms stresses their function in bringing together two or more
18 market ‘sides’ to allow for transactions to take place—via a credit card or the Uber app. The
19 second usage overlaps with what Cusumano (2010, p. 23–24) calls an ‘industry platform,’ which
20 depends on complementors and network effects to give the service its value—a computer being of
21 relatively little value without the applications that run on it and the users relying on such
22 applications.
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37

38 *Platform Capitalism*

39
40 These two senses of the platform are the basis for theorizations of the platform economy
41 and platform capitalism. In Nick Srnicek’s formulation, platform capitalism emerges after the
42 multiple crises of capitalism, from secular stagnation to the financial crisis of 2008. The
43 prominence of digital platform companies on the stock market comes as capital seeks high-
44 growth investments; their prominence as an industry comes as their shift to data collection
45
46 ‘jumpstart[s] a major shift in capitalism’ (Srnicek, 2016, p. 41). Platforms are intermediaries that
47 facilitate multisided markets: ‘Essentially, [platforms] are a newly predominant type of business
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 model premised upon bringing different groups together' (Srnicek 2017, p. 254). Proposed as a
4 replacement for the competing terms 'gig economy' or 'fourth industrial revolution,' platform
5 capitalism is a manner of describing 'the effects of digital technology on capitalism' (Srnicek
6
7
8
9
10 2016, p. 3).

11
12 Used in parallel to platform capitalism, the term platform economy denotes an era where
13
14 American or Chinese platform-owning technology companies dominate the stock market in
15 valuation; where data-gathering intermediaries are dominant the world round; where digitally
16 mediated transactions transform economy, society, and culture (Chen, 2020; Kenney & Zysman,
17 2016; Pasquale, 2016; Steinberg, 2019; Van Dijck, Poell, & De Waal, 2018). The platform relies
18 on a 'new business model, capable of extracting and controlling immense amounts of data'
19 (Srnicek 2016, p. 6), resulting in a tendency towards monopolistic or oligopolistic firms, and
20 leading some to term this 'surveillance capitalism' (Zuboff, 2019).
21
22
23
24
25
26
27
28
29

30
31 The now-pervasive keyword 'platform' has hence been accompanied since the mid-2010s
32 by a periodizing claim: we live under a new regime alternatively called *platform capitalism* or
33 the *platform economy*. Like Fordism or post-Fordism (Aglietta, 2000; Gramsci, 1971), platform
34 capitalism is presented as an epochal shift; a transformative moment in modes of production,
35 cultural forms, and organizational logics that have a corresponding form of labor: precarious
36 work and the gig economy (Fleming, 2017; Scholtz, 2017). Scholars of India and China have
37 pushed back on these epochal claims, rightly pointing out that platform capitalism is far from
38 uniform; that 'petty capitalism' and 'small-scale and family-based flexible regimes of
39 production' are the norm in China with Alibaba (Zhang, 2020); and the bazaar and the emporium
40 are the real models of the platform marketplaces at work today in India (Athique, 2019),
41 recalling earlier discussions of 'bazaar governance' (Demil & Lecocq, 2006). Nonetheless, the
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 epochal and geographically totalizing iterations of the platform capitalism concept remain
4
5 dominant.
6

7
8 These epochal claims have also impacted organization studies. Some have claimed the
9
10 platform represents ‘a new organisational form based on a relationship between the platform and
11
12 the ecosystem of firms dependent on the platform and users who interact and transact through it’
13
14 (Kenney & Zysman, 2020, p. 55); an alternative to the corporation which is perhaps ‘less
15
16 inevitable than we thought’ (Davis 2016, p. 134). Davis has been a particularly vocal advocate
17
18 for thinking of the platform as a replacement for the corporation, following upon ‘a regime shift
19
20 in the costs of organizing’ (2016, p. 129). Others likewise suggest that a shift from a ‘pipelines to
21
22 platforms’ requires new corporate strategy (Van Alstyne, Parker, & Choudary, 2016, p. 57).
23
24
25 Epochal claims about the platform economy subtend calls for radical shifts in organizational
26
27 strategy—out with the old, in with the new.
28
29
30
31
32

33 ***Theoretical Framework***

34
35 This article takes a different approach, elucidating the automotive lineage of platforms, with an
36
37 emphasis on continuities rather than discontinuities, betting on the usefulness of established tools
38
39 of analysis and the value of historical consciousness. In this regard, platform capitalism may best
40
41 be described as *automobile platform capitalism*: as a set of production practices, labor-
42
43 management techniques, and data accumulation strategies optimized for the ‘production and self-
44
45 expansion of capital’ (Wood, 2002, p. 3) that grew out of the auto industry, particularly in its
46
47 Toyotist form. Indeed, in Toyota’s post-1950s management innovations we find many of the
48
49 elements central to definitions of platform capitalism, including:
50
51
52

- 53
- 54 • data gathering and mobilization
- 55 • the modeling of firms as intermediaries or hubs between production sites
- 56
- 57
- 58
- 59
- 60

- the reliance on temp workers
- the crucial role of logistics
- just-in-time models of production and delivery
- platform models of standardization plus variation
- the outsourcing of risks and warehousing costs to subsidiary or supplier firms

The auto industry and Toyota's contributions to it are hence the missing pieces of the history of the platform economy (as industry) and the platform concept (as theory) that informs it.

Cusumano's work points to this connection between the auto industry and digital platforms. Yet Cusumano limits this connection to the stack model of the platform, whereas this article demonstrates that both stack and intermediary models of the platform have their roots in Toyotist automobile production. Toyotism is the unseen industrial and epistemological background against which the platform economy plays out.²

Pointing to this longer lineage allows us to temper some of the grander claims about novelty over continuity at play today in both critical and celebratory discussions of platform capitalism, and thus the consequences for organization being drawn from them. In doing so I draw on crucial contributions to a literature of caution in organizational studies that mitigate against the frequent adoption of new, epochal paradigms (Du Gay, 2003) and argue for the need to attend to the historical dimension of organization research (Booth & Rowlinson, 2006). As Du Gay writes:

What is striking about much contemporary organizational theorizing—whether critical or more commercially purposeful—is the epochalist terms in which it is framed. By 'epochalist' I refer to the use of a periodizing schema in which a logic of dichotomization establishes the available terms of debate in advance, either for or against. (2003, p. 664)

Du Gay's words of caution are as helpful amidst current platform epochalism as they were in 2003. There are crucial continuities between automobile manufacture and digital intermediaries

1
2
3 such as Uber (Fleming, 2017; Rosenblat & Stark, 2016; Scholz, 2017), or the logistics-dependent
4
5 Amazon for that matter. Here I use Uber as a shorthand both for the platform economy and its
6
7 automobile centrism (including Didi Chuxing, Waymo, Tesla, and other auto-centric platforms;
8
9 but equally so other non-auto platform giants like Google or Amazon). Under the hood, most
10
11 platform companies (with the possible exception of social media) are ultimately data-dependent
12
13 logistics firms, in the mold of Toyota.
14
15

16
17 In stressing the continuities between the automobile industry and the platform economy,
18
19 this article also builds on John Urry's visionary work on 'automobility', reaffirming his emphasis
20
21 that the car is 'the quintessential manufactured object' that integrated different sectors of
22
23 twentieth century capitalism (Urry, 2004, p. 25–26)—and extending it into the twenty-first
24
25 century. Urry foregrounds the determining role of the 'system' of automobility to the design of
26
27 roads; to steel production; to the oil economy; and suburban life. Dennis and Urry also predict
28
29 the increasing interdependence of the automobile and information technologies (2009; Urry,
30
31 2004). Building on this insight I detail not the extension of digital platforms into the car as
32
33 entertainment systems (i.e. platforms *in* cars), but how the principles of Toyotist auto production
34
35 inhabit the platform industry in its entirety (platforms *as* cars).³
36
37
38
39

40
41 Along with tracing the longer trajectory of industry practices, the lineage from the car to
42
43 the platform traced here further aims to denaturalize assumed equivalences between platforms
44
45 and the digital, finding something else at the platform's beginnings: a car not a computer. In the
46
47 context of this special issue, the aim is to show that a crucial lineage of the platform has been
48
49 overlooked. Following Beyes, Conrad, and Martin's prompt to think 'media through organization
50
51 and organization through media' (2019, p. viii), this article demonstrates that automobile
52
53 manufacture and its organization are the basis for the digital media artefacts we call platforms.
54
55
56
57
58
59
60

1
2
3 Before the car's traces are fully erased in its subsumption by the digital, we must recover the
4
5 automobile roots of the platform—much as Cornelia Vismann narrates the history of material files
6
7 on the cusp of their replacement by icons of folders on desktop computers. Vismann argues that
8
9 a 'history of files therefore also contains a prehistory of the computer' (2008, p. 164). So too, the
10
11 history of Toyotism contains the forgotten prehistory of platform capitalism.⁴ Recovering this
12
13 account allows us to better account for the return to automobility within platform enterprises:
14
15 Uber and Didi, of course, but Waymo, Tesla, and Toyota as well.
16
17
18

19 To substantiate this lineage, below I trace the two models of the platform—stack and
20
21 intermediary—to Toyotist transformations of the auto industry, illustrating the industrial
22
23 continuities between the automobile industry and the information technology sector.
24
25

26 Subsequently, I show how academic discussions of platforms have taken their start in writing on
27
28 the auto industry. Platforms are doubly determined by the auto sector, then: by their data-centric
29
30 industry manufacturing practices, and by automobile theory's formative influence on digital
31
32 platform theory.
33
34
35
36
37

38 **Toyotism in Practice: Industry**

39 *The Stack Model*

40
41
42 The automobile industry is one of the first sites where we see an overt deployment of the
43
44 stack as an industrial model of platform development: building multiple models of cars from a
45
46 single base or standard; a 'number of different body styles spun off a base model (or 'platform,'
47
48 in car talk)' (Womack, Jones, & Roos 1990, p. 112). The look of a given car is determined by the
49
50 body stacked on top of the platform. This underbody includes the chassis, the steering
51
52 mechanism, and sometimes the engine, common to different car models, sometimes belonging to
53
54
55
56
57
58
59
60

1
2
3 entirely distinct brands. For instance, since the early 2000s, the Volkswagen Golf hatchback and
4
5 Jetta sedan, the Audi A3 sedan and Q3 SUV, and the Skoda Octavia sedan are a few of the cars
6
7 that all share the same underbody or platform – different models, price points, and brands all
8
9 housed on top of the same platform (Mike, Mats, & Javier, 2007, p.12).
10
11

12 This system of platform standardization with model-level variation was pioneered by
13
14 Ford in the 1920s, and further developed by General Motors (GM), which aimed for a full
15
16 product and model range from inexpensive to expensive; a practice optimized by Toyota in the
17
18 1960s on (Mike et al., 2007; Ohno, 1988, p. 113; Womack et al., 1990, p. 34). Toyota develops a
19
20 flexible production system, responsive to market demands and offering the greatest product
21
22 variety combined with base-level standardization—all the while avoiding the over-accumulation
23
24 of parts and overproduction of vehicles that plagued both Ford and GM (Womack et al., p. 64).
25
26 Today, the automobile industry as a whole operates according to a model of platform thinking
27
28 (Mike et al. 2007, 4) – including almost all mass production car manufacturers, from Toyota to
29
30 VW, Nissan, Fiat and GM (Whitford & Zirpoli, 2016).
31
32
33
34

35 The *term* platform was first used in the automobile sector in the early 1970s to describe
36
37 this manufacturing practice. Prior to this, the base-level standard was referred to as ‘chassis,’
38
39 ‘model,’ ‘base model,’ ‘base-shell,’ or ‘body shell’. The popularization of the term platform in
40
41 the automotive sector seems to date to the late 1970s, with its usage increasing by around 1978–
42
43 79, becoming the go-to term by the 1980s (ex: Flint & Tomarkin, 1979, p. 51).⁵ A 1980 report to
44
45 the U.S. government describes the ‘now almost universal acceptance of the platform strategy
46
47 (one basic car design that can be stretched or shortened without complete retooling of all phases
48
49 of the production process) to cut production costs’ (“World Auto Trade,” 1980, p. 234). By this
50
51
52
53
54
55
56
57
58
59
60

1
2
3 point the term is established in public discourse – notably prior to its widespread use in
4
5 computing.
6

7
8 A thorough examination of the Factiva global news and magazine database, parsed
9
10 semantically, supports this point, showing that the use of the term *platform* in relation to
11
12 computing only begins in the mid-1980s, slightly *after* its usage in the auto industry. Some track
13
14 the computer industry use of the term platform to the mid-1990s, led first by Microsoft and then
15
16 Netscape (Plantin et al., 2018, p. 296). Others suggest that it was in the ‘late 1980s and 1990s’
17
18 that the ‘computer industry underwent a dramatic shift from a traditional supply chain logic
19
20 dominated by computer assemblers to a new platform logic’ (Gawer & Philipps 2013, p. 1036).
21
22 Yet the computer usage of platform only overtakes the automobile industry over the course of
23
24 the 1990s as the industries trade places in economic prominence and analytic focus. Contrary to
25
26 assumptions of a computer-industry origin of the concept, often back-projecting it to decades
27
28 earlier (for instance, calling the IBM 360 a platform [Bresnahan & Greenstein, 1999]), we find it
29
30 in the auto sector first, expanding from there to the information technology sector. The stack
31
32 platform concept hence emerges from the automobile industry and its analysis, only later
33
34 migrating to computing.
35
36
37
38
39
40
41

42 ***The Intermediary Model***

43
44 If the stack model for the platform is traceable to developments first undertaken at Ford
45
46 and GM, Toyota is where we see the development of data-intensive production and the platform
47
48 as intermediary. Toyotist automobile assembly and manufacture, known as the Toyota
49
50 Production System (TPS), was based on ‘just-in-time’ (JIT) principles developed in 1948 and
51
52 expanded in the mid-1950s (Cusumano, 1985, p. 278-9), a model of ‘lean manufacture’, and
53
54
55
56
57
58
59
60

1
2
3 communicational porosity during the production process (Womack et al., 1990). Abandoning the
4
5 Fordist ‘just-in-case’ logic of overproduction (Sayer, 1986, p. 43), Toyotist just-in-time
6
7 production began building the automobile upon receiving the consumer’s order, with data
8
9 gathered at multiple points in the production process. As noted above, Toyotism includes the
10
11 following elements:
12
13

- 14 ● just-in-time production processes supported by “kanban” cards and other feedback
- 15 mechanisms throughout the production process
- 16 ● worker initiatives to suggest adaptations to the production line
- 17 ● continuous improvement to the production process (known as “kaizen”)
- 18 ● rigorous forms of quality control
- 19 ● tight informational loops between automobile dealers, salespeople, and the factories and
- 20 component producers themselves, making for a highly adaptive, data-reliant production
- 21 process (Cusumano, 1985; Dohse et al., 1985; Hines et al., 2004; Martin Kenney &
- 22 Florida, 1993; Tsutsui, 2001).
- 23
- 24
- 25

26 During its managerial heyday in the 1980s and 1990s, the TPS was variously described in
27
28 manuals, management literature, and the popular press as TPS, JIT, lean manufacturing, or zero
29
30 inventory (Andrijasevic et al., 2021).
31
32

33 Ohno Taiichi (1988, p. 15), the architect of the TPS, describes just-in-time as a system
34
35 based around ‘the absolute elimination of waste’. According to Ohno, ‘Just-in-time means that,
36
37 in a flow process, the right parts needed in assembly reach the assembly line at the time they are
38
39 needed and only in the amount needed. A company establishing this flow throughout can
40
41 approach zero inventory’ (Ohno 1988, p. 15). Only the minimum necessary number of cars are
42
43 produced, using parts arriving just-in-time for their use on the production line, thereby
44
45 eliminating the need for ‘wasteful’ storage space on the premises. The main tool used in the
46
47 elimination of waste and the operationalization of just-in-time was the *kanban* system. The
48
49 *kanban* is a paper sheet encased in a translucent vinyl plastic cover that allowed workers to order
50
51 additional parts as they run low. As the assembly line moves in one direction, *kanban* move in
52
53
54
55
56
57
58
59
60

1
2
3 the opposite direction, informing internal and external suppliers what parts are needed and when,
4
5 building a real-time data set about supply levels (Monden 1994, p. 9). The kanban system also
6
7 allowed Toyota to position itself as an intermediary between multiple parts suppliers and the
8
9 final consumer during the sequence of production.
10
11

12 The essential element of the Toyota Production System was hence the once low-tech
13
14 informational system supported by this mobile piece of paper, recalling what Bruno Latour in a
15
16 different context referred to as an ‘immutable mobile’ (Latour, 1986, p. 7); a small, paper-based
17
18 object that allows control to be exercised at a distance, in this case over the company’s suppliers.
19
20 As veteran TPS analyst Yasuhiro Monden puts it, ‘The kanban system is an information system
21
22 that harmoniously controls the production of the necessary products in the necessary quantities at
23
24 the necessary time in every process of a factory and also among companies’ (1994, 15). While
25
26 Toyota experimented from the 1950s on with computers to coordinate production, into the 1980s
27
28 Ohno and his managers found it ‘unnecessary to buy costly software and computer systems when
29
30 the paper kanban provided accurate information, almost instantaneously, on changes in
31
32 production capacity, operating rates, and manpower’ (Cusumano, 1985, p. 298). The simple
33
34 kanban represents an organizational system and technology of data collection and control that
35
36 coordinated the massive, geographically sprawling Toyota enterprise, including its multi-tier
37
38 layers of supplier firms. The system positioned Toyota as an intermediary between stages within
39
40 production, and, ultimately, consumption in a manner that anticipates contemporary platforms. In
41
42 this regard that we can say Toyota anticipates the intermediary model of the platform. Like Uber
43
44 today, Toyota operated as a coordinating intermediary: it gathered and mobilized data in car
45
46 production, it delegated the production of parts to multiple suppliers, and it functioned as an
47
48 intermediary between end consumers and suppliers.
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 This reliance on a large number of suppliers is another key element of the TPS. Toyota
4
5 subsidiaries and subcontractors produced up to 70% of the final material of the automobile–
6
7 compared to 30-50% within US suppliers (Kenney & Florida, 1993, p. 46). Toyota plants operate
8
9 as central hubs around which a series of subsidiary companies and subcontractors are arrayed
10
11 (Kaneko & Nojiri, 2008). These are figured in a core-periphery model, featuring some ten tiers
12
13 of suppliers around a central production hub. Whereas core companies ensure guaranteed
14
15 employment, the contractors—contrary to earlier depictions of Japanese lifelong employment
16
17 (Ouchi, 1980, p. 132)—depend on expendable, precarious laborers, often women or temporary
18
19 foreign workers (Yamada, 2010), anticipating the gig economy of today (a longer history
20
21 Fleming (2017) delineates via human capital theory in another context). These massive, just-in-
22
23 time, distributed production complexes function as the ‘ultrastructure’ of the Japanese economy
24
25 (Kennedy and Florida 1993, p. 46). (Fiat has a similar reliance on outsourcing, as noted by
26
27 Whitford and Zirpoli (2016, 1231), though space does not allow for more extensive comparisons
28
29 between the two companies.)
30
31
32
33
34

35 In the words of a popular trade book, Toyota CEO ‘Ohno’s idea was simply to convert a
36
37 vast group of suppliers and parts plants into one large machine’ (Womack et al., 1990, p. 61). At
38
39 first this information system operated only in the sphere of production; later it tied moments of
40
41 purchase back to the sphere of production. In so doing Toyota elaborated ‘a sales network very
42
43 similar to the Toyota supplier group’ (Womack et al., 1990, p. 66). A network of vendors, who
44
45 traveled around to their customers’ homes to canvass their needs, reported back their preferences
46
47 and auto orders to Toyota’s head office. Consumers’ orders for new cars mirrored kanban cards,
48
49 this time moving forward to the production facilities. In Toyota’s built-to-order system the
50
51 vendor became the ‘first step in the kanban system, sending orders for presold cars to the factory
52
53
54
55
56
57
58
59
60

1
2
3 for delivery to specific customers in two to three weeks' (Womack et al. 1990, p. 66). Even when
4 not selling a car, vendors making the rounds to customer homes in Japan helped accumulate data
5
6 about each customer's family status, car purchase history, and preferences, ensuring that
7
8 'distribution [became] a fully integrated part of the entire production system' (Womack et. al.
9
10 1990, p. 194). The TPS was hence one giant informational network, first conceived via the
11
12 movement of the paper kanban, and later executed by networked computer systems like those
13
14 used by airline reservation systems to regulate orders to the head company and then downstream
15
16 to suppliers (Kaneko & Nojiri, 2008, p. 163; Aoki 1990, p. 5).
17
18
19
20
21

22 Within this system, Toyota occupied the place of a data-gathering intermediary shuttling
23
24 information about demand throughout the entire production network, from vendors and
25
26 dealerships to secondary and tertiary suppliers. Again, this hub-like function of the Toyota
27
28 factory is structurally akin to the intermediary function of platforms within a multisided market.
29
30 Toyota as production hub and coordinator hence anticipates the data-intensive, intermediary-
31
32 style operations of the platform enterprise as a horizontally organized firm that sees the
33
34 proliferation of data points: salespeople, consumers, firms, subcontractors, and workers.
35
36 Toyota's role in managing production anticipates the model of digital intermediaries like
37
38 Facebook (Beverungen et al., 2015) or Amazon in their coordination of buyers and sellers. Like
39
40 the digital platforms that would come later, the boundaries between inside and outside, and direct
41
42 employees and indirect laborers blurred within Toyota's production system as it connected
43
44 multiple agents whom it mediated. In its hub-like coordination of multisided markets, Toyotism
45
46 is a crucial organizational antecedent of platform intermediaries today. Figure 1 maps these
47
48 correspondences.
49
50
51
52
53
54
55
56
57
58
59
60

Toyotist automobile production (1950s~)	Platform Capitalism (2000~)
Automobile industry built around stack (started with Ford; further developed by GM and then Toyota)	Stack model of platform for computers or social media sites
Term <i>platform</i> used in relation to base or chassis as of late 1970s	Term <i>platform</i> used in relation to computers in 1990s, and social media sites as well as digital intermediaries as of the 2000s
Production of cars based on Toyotist plant as hub or intermediary; most production of parts is outsourced	Intermediary model of the platform is dominant in descriptions of platform capitalism
Subsidiary and sourcing firms use temp or just-in-time labor model	Temp or just-in-time labor model dominates
Toyota gathers data on production and consumption, modifying production plans based on consumer data as gathered by salespeople	Platforms are data-intensive and data-dependent; they gather data to optimize production (Netflix), search results (Google), or driver paths (Uber)
Production starts when an order is placed; Toyota ramps up or down production as needed; just-in-time is the model	Production or service-provision starts when an order is placed; on-demand is the model
Toyota outsources risk (and storage) to suppliers, expecting immediate delivery of parts	Uber outsources risk (and wait times) to drivers, expecting immediate delivery of service

Figure 1: Parallels between the Toyota Production System and platform capitalism.

From Toyotism to Digital Platforms: Theory

The above section charts the platform stack and intermediary models as they develop in the manufacturing practices of the automobile industry. In this section I focus attention on the history of popular and academic management writing *about* platforms, presuming the impact management writing has on industry practices (Gregg, 2018; Hoof, 2020; Liu, 2004). Here I trace the conceptual development of the stack and intermediary models of platforms from the automobile sector to information technology through the work of two figures: American

1
2
3 management scholar Michael Cusumano, and Japanese management scholar Kokuryō Jirō. Their
4
5 work represents two crucial moments of transition from automobile to digital platforms.
6
7

8 9 10 ***American Platform Theory***

11 The development of platform theory within American and Japanese management
12 literature in the 1990s is deeply indebted to its initial location inside automobile industry
13 analysis. One of several figures connecting the two is Michael Cusumano, a US-based academic
14 trained at Harvard as an economic historian of Japan's automobile industry, who subsequently
15 taught within MIT's Sloan School of Management. In the 1980s and 1990s he was associated
16 with MIT's International Motor Vehicle Program (IMVP), formally joining MIT in 1986. The
17 IMVP was an influential program driven by American and international corporate and
18 governmental efforts to grapple with changes the automobile industry was undergoing, and the
19 Japanese 'lean manufacturing' challenge in particular (Womack et al., 1990, p. 2). Indeed 'lean'
20 was itself coined by an IMVP researcher and popularized by *The Machine that Changed the*
21 *World* (Holweg, 2007; Womack et al., 1990). The IMVP was established with automobile
22 manufacturers' funding to study the Japanese production system at a moment when it posed an
23 existential threat to European and American automobile companies. It also served as a bridge,
24 helping Japanese manufacturers Toyota and Nissan establish branch plants in the US and Europe.
25 The IMVP was where much of the English language empirical and theoretical work on Toyotism
26 first developed in the 1980s (Hines et al., 2004), and is a crucial site from which platform
27 research emerges – first around automobiles, later around the computer industry, and today
28 around the platform economy.
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 Cusumano's work is foremost among this research group that started with automobile
4
5 platforms before pivoting to digital platforms (Cusumano et al., 2019). Cusumano's earliest work
6
7 was his 1985 book, *The Japanese automobile industry: Technology and management at Nissan*
8
9 *and Toyota*. Based on his PhD dissertation, this extensively researched tome 'attempts to rectify
10
11 a major oversight – the absence of a comprehensive history of Nissan, Toyota, and the industry
12
13 they have dominated for five decades in Japan' (Cusumano, 1985, p. xix). This book was
14
15 released amidst a flurry of studies on the Japanese automobile industry, including more popular
16
17 overviews such as David Halberstam's *The Reckoning* (1986), Richard Schonberger's *Japanese*
18
19 *manufacturing techniques* (1982) and Robert Hall's *Zero Inventories* (1983). Substantial
20
21 research in Japanese on Toyotism already existed, and was being translated into English by the
22
23 1980s (Holweg 2007, p. 431). Yet Cusumano's book stands out for its close attention to
24
25 manufacturing processes and their histories—an approach adopted by IMVP researchers around
26
27 this time.
28
29
30
31
32

33 By the late-1980s Cusumano had turned his attention to the software industries, first in
34
35 Japan, and later in the US as well, publishing *Japan's Software Factories* in 1991 (Cusumano,
36
37 1991) before shifting to the study of Microsoft (Cusumano & Selby, 1995) and then Netscape
38
39 (Yoffie & Cusumano, 1998). At the same time, he continued his work on the automobile
40
41 industry, extending his earlier work with attention to platforms in his co-authored book with his
42
43 student and former Mazda employee Nobeoka Kentaro, *Thinking beyond lean* (Cusumano &
44
45 Kentaro, 1998). This dual attention to the automotive and the digital is significant, and the
46
47 former arguably informs his analysis of digital platforms.
48
49
50

51 As Cusumano was transitioning to an analysis of digital platforms, another group of
52
53 scholars was extending the stack model of the platform from within automobile analysis to other
54
55
56
57
58
59
60

1
2
3 product families, forming the ‘product platform’ subgenre of analysis in the 1990s. Wheelwright
4 and Clark (1992) are credited with the expansion of the term from the auto sector outward
5
6 (Gawer, 2009, p. 46), and they draw on the automobile industry’s framing of the term as both a
7
8 system of parts and a process of product design (Holweg, 2007, p. 424). Even as they expand the
9
10 platform concept beyond the car, Wheelwright and Clark anchor their account of this expanded
11
12 platform concept with reference to automobiles: ‘Honda’s 1990 Accord line is an example of a
13
14 new platform in the auto industry: Honda introduced a number of manufacturing process and
15
16 product changes but no fundamentally new technologies’ (Wheelwright & Clark, 1992, p. 73).
17
18 They continue with a reference to computers before expanding to a wide range of products,
19
20 including Tide detergent: ‘In the computer market, IBM’s PS/2 is a personal computer platform;
21
22 in consumer products, Procter & Gamble’s Liquid Tide is the platform for a whole line of Tide
23
24 brand products’ (1992, 73). The sequence from automobile to computer to cleaning products is
25
26 indicative of the centrality of cars to platform theory. Wheelwright and Clark’s early foray into a
27
28 generalized platform theory was followed by works by Meyer and Lehnerd, including their
29
30 popular book, *The Power of Product Platforms* (1997). Product platform literature hence
31
32 emerges from the automobile platform concept and leads to research around ‘modular product
33
34 architectures and component reuse’ (Cusumano 2010, p. 32). As Suarez and Cusumano notes
35
36 ‘The auto industry was probably one of the first to adopt a platform strategy’ (2009, p. 77-78).
37
38 Platform theory until this point was informed by the stack model.
39
40
41
42
43
44
45
46

47 Building on the platform family concept but breaking both with its automobile origins
48
49 and the presumption of adherence to a single family or brand, Cusumano introduces a version of
50
51 the intermediary model in his influential book, cowritten with Annabelle Gawer, *Platform*
52
53 *Leadership* (2002). *Platform Leadership* is one of the earliest management books about hardware
54
55
56
57
58
59
60

1
2
3 and software platforms in the early twenty-first century. The book builds on Cusumano's mid-
4
5 1990s work on Microsoft and Netscape, as well as on Gawer's dissertation research; Gawer has
6
7 since become one of the most important figures in platform management studies. *Platform*
8
9 *Leadership* differentiates the stack model of the product platform from a newer model of the
10
11 platform, what they variously call 'technology platforms,' or 'industry platforms' (Gawer &
12
13 Cusumano, 2002). In Cusumano's later definition, technology platforms provide 'a common
14
15 foundation or core technology that a firm can reuse in different product variations, similar to an
16
17 in-house product platform' (2010, 32). The twist is that these reuses are assumed to be outside
18
19 the company; the company disaggregates the platform (base) from its 'complements' (external
20
21 software components or products that give the platform its value). This in turn requires 'a
22
23 strategy to open their technology to complementors and create economic incentives (such as
24
25 licensing fees or financial subsidies) for other firms to join the same 'ecosystem' and adopt the
26
27 platform technology as their own' (Cusumano 2010, p. 33). The distinction between Microsoft
28
29 and Apple during the 1980s is an obvious one in this context: Microsoft more successfully
30
31 supported other companies ('complementors') creating software for its Windows operating
32
33 system, which became the dominant OS (Gawer & Cusumano, 2002, p. 7). In this view
34
35 complementors become more important to the success of a product than the product itself.
36
37
38
39
40
41

42 This emphasis on external complementors is a crucial step towards the now-dominant
43
44 intermediary model of the platform. Understanding the technology platform as existing in a state
45
46 of codependency with a system of objects—objects that increase the value of the platform for both
47
48 the user and owner—signals a shift from a vertical platform stack model structure to the
49
50 horizontal platform intermediary model. As seen in this brief account of Cusumano's work, the
51
52 horizontal intermediary model emerges out of initial research on automobile platforms,
53
54
55
56
57
58
59
60

1
2
3 extending into work on digital platforms.⁶ It also provides a conceptual articulation of the
4
5 intermediary model we saw already in industry practice in the Toyota Production System.
6
7
8
9

10 *Japanese Platform Theory*

11
12 This intermediary concept of platform also develops several years earlier by way of a
13
14 separate (and to Anglophone scholars relatively unknown) group of Japanese management
15
16 thinkers in the early 1990s. Here the platform begins as a way to grapple with the digital shift
17
18 and the potentials of internet-mediated commerce. Yet here too the automobile industry plays an
19
20 important role to the development of this theory. In this the figure of Kokuryō Jirō is central.
21
22 Kokuryō is a Harvard business school-trained Japanese management studies scholar who along
23
24 with established management thinker Imai Ken'ichi developed some of the first theorizations of
25
26 the platform as a mediation device for third party transactions (Negoro & Ajiro, 2012)—what
27
28 would later become the mainstream of platform theory in the 2000s in the English speaking
29
30 world, especially via the economics of multisided markets (Rochet & Tirole 2003). Kokuryō's
31
32 work sparked the development of Japanese intermediary platform theory, which in turn inflects
33
34 the emergence of Japanese mobile internet systems such a 'i-mode' (as well as the iPhone and
35
36 Android systems inspired by it), which are premised around the centrality of the mobile phone as
37
38 interface and hub for the digital economy (Kodama, 2003; Natsuno, 2003; Steinberg, 2019). This
39
40 precedes and yet has overlaps with French and American research on industry platforms and
41
42 multisided platforms.
43
44
45
46
47
48

49 A crucial first intervention here was the special issue of the journal *InfoCom REVIEW*
50
51 titled 'Platform Business,' which Imai and Kokuryō co-edited in 1994, followed by monographs
52
53 by Kokuryō (1995) and Negoro and Kimura (1999), among others. The *InfoCom* special issue,
54
55
56
57
58
59
60

1
2
3 released amidst increasingly widespread use of proprietary information networks by companies
4 like Toyota and 7-Eleven (Marutschke, 2011) and on the cusp of the widespread
5
6 commercialization of the Internet in Japan in the mid-1990s, promised to account for what Imai
7
8 describes as the ‘massive changes the Japanese industrial system is undergoing’ (Imai, 1994, p.
9
10 3).⁷ The aim was to examine ‘how the advances and innovations in information and
11
12 communications technologies lead to changes in the mechanisms of transactions between
13
14 companies, and how these in turn led to changes in company organization and industrial
15
16 organization’ (Imai, 1994, p. 3). The framing here is familiar to us from Davis (2016), Alaimo
17
18 and Kallinikos (2020), and others above: how new technologies lead to new organizational
19
20 forms. For Imai, the focus on transactions opened up a new front in the study of business
21
22 organizations, via the concept of the platform. Imai presents the special issue as a step towards
23
24 mapping some of the transformations wrought by digital technologies on the structure of inter-
25
26 company trading and the ‘keiretsu’ business model, with the aim of envisaging the ‘composition
27
28 of the new industrial organization’ (1994, p. 3), with corporations modeled as transactional
29
30 intermediaries.

31
32
33
34
35
36
37
38 Kokuryō would define the platform business as ‘one where the existence of a foundation
39
40 or base provided by a private business allows anyone to supply goods and services to another
41
42 party under a specific set of conditions, thereby invigorating transactions between third parties
43
44 and building new businesses’ (1994, 4). He offers the following examples of such platforms:

45
46
47 Credit cards and other intermediaries of trust allow various businesses to be established
48
49 and enable transactions between third parties to take place. Express delivery services, for
50
51 instance, enable the creation of new transactional forms built around direct-from-the-farm
52
53 deliveries, allowing the farm owner to establish a profitable business. Or, yet another
54
55
56
57
58
59
60

1
2
3 example of the meaning of platform business can be found in manner in which Microsoft,
4
5 by providing what is a ‘de facto standard’ OS, in turn allows for the establishment of
6
7 independent companies built around offering related products and services. (Kokuryō
8
9 1994, p. 4)

10
11
12 Each example Kokuryō provides is one in which a basic service or technology provides the
13
14 ground from which other companies and businesses can spring into existence and mediate
15
16 between third parties. In this sense he offers a synthesis of the two models of platforms we saw
17
18 above: the stack model and the intermediary model.

19
20
21 Kokuryō explicitly articulates this as a shift from a vertical model of the industrial
22
23 organization to a horizontal model of industrial organization (1994, p. 5). Proposed with an eye
24
25 to the effects of networked technologies on industrial relations, the platform also promised a shift
26
27 from vertical integration to horizontal intermediation as an industrial model; from conglomerate
28
29 or keiretsu to intermediary firm. This conception of the platform as both layered material support
30
31 *and* intermediary is a composite of product platforms and technology platforms—both stack and
32
33 intermediary, giving a first theoretical articulation of the industrial developments by Toyota
34
35 tracked in the previous section.

36
37
38 In this regard, Kokuryō and his collaborators’ attention to the automobile industry—
39
40 industrial and automobile parts supplier Misumi was one of their case studies; the Aucnet used
41
42 car auction another—as well as their more general concern with what Imai called ‘changes in
43
44 company organization and industrial organization’ suggests further connections between the
45
46 automobile industry and the reconceptualization of industrial forms they undertake in their
47
48 special issue. I would further speculate that the conditions for this initial development of the
49
50 intermediary platform model were the particular conjunction of the rise of information
51
52
53
54
55
56
57
58
59
60

technologies alongside the 1980s and 1990s hype around the intermediary industrial organization pioneered in the automobile industry, and by Toyota in particular. If this ‘platform business’ theory could emerge at this time, it was likely due to the prominence of the auto industry’s hub-like production practices in the first place. The auto industry offers the epistemological ground for the development of what would become digital platform theory.

To sum up, Cusumano’s research trajectory demonstrates how work on automobile platforms lays the ground for work on computing and digital platforms. Kokuryō’s platform business theory, including its deft marriage of stack with intermediary models of the platform, demonstrates how digital-first platform theory of the 1990s was itself still preoccupied with changes to one of the largest sectors of the Japanese economy: the automobile industry. Both scholars continue to be leading voices in the articulation of the digital platform economy in the US and Japan, with two examples being Cusumano’s co-authored *The Business of Platforms* (Cusumano, Yoffie, & Gawer, 2019) on the one hand, and Kokuryō’s co-edited (Japanese) volume *Platforms for Emergent Management* (Kokuryō & Platform Design Lab, 2011) on the other. Figure 2 summarizes these correspondences.

Michael Cusumano / US Platform Theory	Kokuryō Jirō / Japanese Platform Theory
Starts with automobile analysis in 1980s-90s	Starts with concern over changes in company organization and industrial organization due to new communications technologies, mid-1990s
Automobile analysis informs “product platform” analysis that offers computers as one example	Kokuryō combines a stack model of platform (one business builds base for another) and intermediary model (enabling transactions between third parties)
Cusumano shifts to software and then platform analysis during 1990s and 2000s, publishing <i>Platform Leadership</i> in 2002	Automobile parts supplier Misumi is one case study; Aucnet used car auction another

Cusumano and Gawer (2002) introduce the complementors model of the intermediary, explaining dominance of Microsoft with its 'ecosystem' approach	Background of digital platform theory are Japanese automobile companies and the existing structure of the Japanese industrial system
Becomes a leading voice in articulating platform economy in U.S.	Becomes leading voice in articulating platform economy in Japan

Figure 2: Summary of the distinct trajectories of platform theory in the US and Japan.

Discussion

In the above sections this article outlines the industrial dependencies and theoretical continuities between the automobile sector and platform businesses. In doing so this article tracks changes in both industry practices and theoretical analysis, noting how the platform theory of Gawer, Srnicek and others is deeply dependent on developments in the automobile sector. In what follows I will highlight some crucial takeaways of this shift from a computing to an automobile lineage of platforms, particularly in light of this special issue's interrogation of the relation between technology and organization.

First, this longer lineage of platform theory and practice this article traces back to the automobile industry, the crucial industry of the 20th century, paves the way for a reevaluation of the history and periodization of the platform today. It rescues the automobile platform from its erasure by digital platforms and suggests we may have something to learn from an increased focus on manufacture as a site of analysis (Qiu et al., 2014). In particular, the crucial role of just-in-time in both Toyotism and platform capitalism (via 'on demand' services in the latter) suggests an occluded connection between the two that should be further investigated moving forward. This lineage allows us to be critical of the presentism of writing about platforms. It also reminds us of the need to be cautious of claims of novelty whether they be in relation to the

1
2
3 newness of new media (Chun, 2016) or to epochal paradigms in the study of organizations (du
4
5 Gay, 2003).

6
7
8 Consequently, we should reappraise recent writings on platform capitalism such as
9
10 Srnicek's which, while very valuable in mapping the financial conditions for the rise of
11
12 platforms and in creating platform typologies, tends to present the data-centrism and mediatory
13
14 emphasis of the platform era as novel and Silicon Valley-centric. Platform capitalism should be
15
16 considered an extension of Toyotism and automobile logics, rather than a complete break from
17
18 these. To return to Vismann's argument that a 'history of files therefore also contains a
19
20 prehistory of the computer' (Vismann, 2008, p. 164), we must assert that the history of Toyotism
21
22 contains the (or *one*) forgotten prehistory of platform capitalism. This becomes all the more clear
23
24 when we observe how everything from firm organization (e.g. the lean organization) to software
25
26 programming (e.g. Agile) to start-up philosophies (e.g. the 'lean start-up' [Ries, 2014]) revolve
27
28 around 'lean' as a mantra.
29
30
31
32

33
34 Second, following from this, we should treat with some caution recent writing in
35
36 organization studies that assumes the demise of the corporation results from the rise of digital
37
38 platforms (Davis, 2016; Van Alstyne et al., 2016). The platform is less a technological object
39
40 that results in the decline of the corporation than a managerial one that allows corporations to
41
42 offer and distribute products and services by other means. It is true that new kinds of asset-light
43
44 companies have emerged, whether Uber or Airbnb—'intermediaries of trust' as Kokuryō (1994, p.
45
46 4) would call them—in which the majority of their 'employees' are in fact contractors. On the
47
48 other hand, platform companies like Google, Microsoft, or Amazon have built computing stacks,
49
50 data warehouses, and logistics systems to support their hub-like intermediary operations, even as
51
52 they too outsource large parts of their activities to contracted employees (Moreno, 2019). As
53
54
55
56
57
58
59
60

1
2
3 such these latter firms more closely resemble Toyota and their multiunit, multi-divisional
4
5 enterprise form, may require a return to a consideration of the multidivisional form (M-form) of
6
7 corporation that Chandler (1977) first analyzed in his treatment of, alongside DuPont, the
8
9 automobile industry and GM in particular. In this regard Srnicek's convergence thesis—'the
10
11 tendency for different platform companies to become increasingly similar as they encroach upon
12
13 the same market and data areas' (2016, p.107)—deserves attention. As Google, Microsoft, and
14
15 Amazon (or Alibaba, Tencent, and JD.com) increasingly operate in the same fields they require
16
17 multiple product divisions to support their activities, suggesting a continuation of the M-form
18
19 organization. As platform firms become massive, monopolistic enterprises operating in multiple
20
21 fields—from video streaming to consumer electronics to robotics to logistics, in the case of
22
23 Amazon—returning to an earlier moment of corporate history (Chandler, 1977) and the attending
24
25 critique of monopoly capital (Baran & Sweezy, 1968) may offer some critical tools for analysis.
26
27
28
29

30
31 Third, the attention to management theory's impact on platform models suggest the
32
33 importance of reading management theory as itself a site of industry modeling. Nigel Thrift notes
34
35 that management discourse 'increasingly... forms a background to how business is practiced'
36
37 (2005, p. 30). Management texts are productive of models used to grapple with the industrial
38
39 changes at hand. They feed back into managers' own activities within their firms. In particular,
40
41 the managerial innovations initiated at Toyota and the ripple effect of lean principles spreading
42
43 across industries suggests that, as Melissa Gregg has written, "Toyotism—not Fordism—is the
44
45 crucial managerial revolution of our time" (personal communication, June 1, 2021; see also
46
47 Andrijasevic et al., 2021). More attention should be paid to the rhetorics, concepts, and ideas
48
49 produced in management theory, and Toyotism in particular, in its complex entanglements with
50
51 organizational practice and media history (Hoof, 2020).
52
53
54
55
56
57
58
59
60

1
2
3 Doing so requires that we appreciate the complex, two-way relationship between
4
5 platform theory and organizational practice. Attending to how one impacts the other allows us to
6
7 see the more circuitous relationship between new technologies as they produce (or do not
8
9 produce) new organizational forms. Equally important here is the gap between technologies and
10
11 practices. Just-in-time production is achieved first by circulating pieces of low-tech paper before
12
13 being integrated into the networked computers and manifesting in the cultural expectations of
14
15 on-demand service that propel JIT today. This ultimately reaffirms Raymond Williams' (2003)
16
17 caution against presuming determinist relations between technology and culture—pushing back on
18
19 McLuhan's (1994) media determinism of the 'medium is the message' and serving as a
20
21 preemptive rejoinder to Kittler's subsequent assertion that 'media determine our situation' (1999,
22
23 p. xxxix). Technologies are bound up with organization (Hoof & Boell, 2019), but, as the
24
25 findings here illustrate, not deterministically so. Media do not simply organize; media
26
27 themselves are organized by social institutions (Conrad, 2019). In this case platforms as media
28
29 and technologies are informed by existing managerial practices. To Alaimo and Kallinikos's
30
31 pithy provocation that the 'the technology is the organization' (2020, p. 18) we might suggest,
32
33 then, that organizations are collections of practices that inform and resist the adoption of
34
35 technologies. This crucial gap between technology and organization is worth attending to.
36
37
38
39
40
41

42 Fourth, in recentering the automobile sector and the transpacific legacies of its study, this
43
44 article reminds us of the complex geographies of the production of the platform concept.
45
46 Displacing its usual association with Silicon Valley firms and showing how the platform as
47
48 concept and practice is produced at a nexus between Japanese and US automobile industries and
49
50 their analyses, this article has shown how theory itself is produced via transnational exchange.
51
52 That this involves an exchange between the world's two largest economies at the time of this
53
54
55
56
57
58
59
60

1
2
3 exchange in the 1980s and 1990s is not surprising. Yet even while Japan has maintained a certain
4 economic hegemony, it has not always been accorded the relative discursive attention,
5 particularly within platform studies. Here, then, this article proposes a certain reorientation of
6 theoretical production (Salazkina, 2015; Steinberg & Zahlten, 2017) by situating platform theory
7 itself as a coproduction between Japan and the US.
8

9
10 Finally, there is a political lesson to learn from refocusing on the car. The automobile
11 industry was a site of intense worker contestation and mobilization in the 20th century (Parker &
12 Slaughter, 1990). In the midst of labor organizing by Amazon and Uber workers, one pragmatic
13 lesson to be drawn from this continuist lineage of automobile capitalism to platform capitalism is
14 that while the solidarities created by co-working in an automobile plant might seem more
15 difficult to recreate in a platform-mediated present, they are not insurmountable. Even amidst the
16 setbacks of these efforts and the challenges of organizing in the face of these massive platforms,
17 scholars have documented the efforts and successes of this mobilization in China, Europe, and
18 North America; solidarities can and are being created among gig workers (Chen & Qiu, 2019;
19 Chen & Sun, 2020; Doorn, 2020; Scholz, 2017). Mobilization for worker rights may be
20 successful, and platforms may be sites of political organization, not simply resignation (Lovink,
21 2021).
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44

45 **Conclusion**

46
47 This article has traced a lineage of the platform that redirects attention from the computer
48 to the car. Developing the heuristic models of stack and intermediary forms of the platform as a
49 means of giving definition to this otherwise slippery term, this article demonstrates the
50 automobile lineage of platform capitalism. It also traces the gig economy to longer histories of
51
52
53
54
55
56
57
58
59
60

1
2
3 outsourcing and precarious labor in the automotive industry, and traces data-mining to practices
4 developed to regulate production at Toyota factories. In doing so, this article has emphasized the
5
6 need to think technology and organizational practices together—as this special issue asks we do—
7
8 all the while suggesting that tales of continuity across technological change are as revealing as
9
10 stories of epochal shift. Attending to such continuities—on the industrial level via Toyota’s
11
12 manufacturing practices as well as on the discursive level by attention to the emergence of digital
13
14 platform theory out of automobile theory in the US and Japan—offers the opportunity to see what
15
16 practices continue from the automobile economy to the platform economy and also what gaps
17
18 there are between technology and organizational practice. Of course, an over-emphasis on
19
20 continuities can obscure real differences between Toyotism and platform capitalism. Digital
21
22 technologies and platforms in particular do see accelerations in the data-gathering possibilities of
23
24 companies that organization studies must engage with, and which I do not have the space to
25
26 engage here. However, amidst a proliferation of new periodizing concepts some attention to
27
28 longer histories is much needed. Before we hitch ourselves to new organizational models or
29
30 paradigms we best heed their obscured lineages, lest revealing continuities be papered over in
31
32 our race to the new.
33
34
35
36
37
38
39

40 This lineage is all the more significant today, as platforms themselves are now
41
42 completing their loops from automobile factories to smartphones back to the automobile with
43
44 Uber, Didi, Tesla, Waymo, Apple and their experiments with autonomous driving and city
45
46 mapping (Chen & Qiu, 2019), not to mention persistent rumours of tech companies getting into
47
48 automobile production. The recent announcement that Foxconn, Apple’s main subcontractor in
49
50 the manufacture of smartphones, is entering the electric vehicle business is a case in point (Hille,
51
52
53
54
55
56
57
58
59
60

1
2
3 Inagaki, & Campbell, 2021). As smartphone makers move into EV production, there is no better
4
5 time to recall this automobile lineage of platform capitalism—including its ecological perils.
6
7

8 The platform's automobile lineage is a reminder that even amidst the celebration of
9
10 platforms by some, or the critique of their hunger for our data by others, we were never as far
11
12 away from the car as we thought. Automobile manufacturing was the crucial industry and system
13
14 of the 20th century (Dennis & Urry, 2009). If the lineage of platform industry and theory traced
15
16 here is any indication, automobile capitalism will remain that of the 21st century as well.
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Notes

¹ While Cusumano made the connection at the discursive level – something I follow more closely below – he tends to treat automobile platform research as separate from digital platforms.

² There may also be other such unseen lineages of the platform economy; this is a preliminary, Toyota-centric account of the emergence of the platform economy. Stephanie Sherman (2020, p. 406) offers a Fordist account of platforms, calling Henry Ford a ‘geopolitical platform logician who propelled automobility to planetary scale’.

³ Whereas Urry treats automobility as a ‘self-organizing, autopoietic, non-linear system’ (2004, p. 27) here I focus more narrowly on automobile production and discourses around it, as a prototype for platform capitalism.

⁴ A significant difference in files and platforms is that whereas files depend upon a media materiality, the fuzzier term platform designates two possible structures and orientations (vertical stack and horizontal intermediary) rather than a specific materiality. Still, insofar as some assumptions about media materiality are built into the platform concept (whether as computer hardware, as support for content, or as infrastructural intermediary between multiple parties), Vismann’s insightful treatment of files is germane to this article.

⁵ This analysis is based on exhaustive searches of the Factiva, ProQuest, Academic Search Complete, and Lexis-Nexis databases, among many others more closely related to the car industry (or production and engineering).

⁶ Here I omit a deeper engagement with what Cusumano himself sees as a major divide in his work: that automobiles are product platforms (not industry platforms) insofar as they allow for modularity within a single firm but do not rely on network effects for their popularity or value, whereas (digital) industry platforms do (2010, p. 33). While true, I would argue that given Toyota’s dependence on data, value accrued to Toyota through the more customers it had, and through its status as intermediary. Hence network effects were in fact in play.

⁷ These and subsequent translations from the Japanese are the author’s.

Bibliography

- Aaltonen, Aleski, & Lanzara, Giovan F. (2015). Building governance capability in online social production: Insights from Wikipedia. *Organization Studies*, 36(12), 1649–1673.
- Aglietta, Michel (2000). *A theory of capitalist regulation: The US experience* (Vol. 28). London: Verso.
- Alaimo, Cristina, & Kallinikos, Jannis (2020). Managing by data: Algorithmic categories and organizing. *Organization Studies*, 0170840620934062.
<https://doi.org/10.1177/0170840620934062>
- Andreessen, Mark (2007). The Three Kinds of Platforms You Meet on the Internet. *Pmarca Blog*. <http://web.archive.org/web/20071018161644/http://blog.pmarca.com/2007/09/the-three-kinds.html>.
- Andrijasevic, Rutvica, Chen, Julie Yujie, Gregg, Melissa, & Steinberg, Marc (2021). *Media and management*. Minneapolis, MN: University of Minnesota Press.
- Athique, Adrian (2019). Digital emporiums: Platform capitalism in India. *Media Industries Journal*, 6(2). <https://doi.org/10.3998/mij.15031809.0006.205>
- Baldwin, Carliss Y., & Clark, Kim B. (2003). *Managing in an age of modularity. Managing in the Modular Age: Architectures, Networks, and Organizations*, 149.
- Baran, Paul A, & Sweezy, Paul M. *Monopoly capital: An essay on the American economic and social order*. New York: Modern Reader Paperbacks, 1968.
- Beverungen, Armin, Böhm, Steffen, & Land, Chris (2015). Free labour, social media, management: Challenging Marxist organization studies. *Organization Studies*, 36(4), 473–489. <https://doi.org/10.1177/0170840614561568>

1
2
3 Beyes, Timon, Conrad, Lisa, & Martin, Reinhold (2019). *Organize*. University of Minnesota
4
5 Press.

6
7
8 Bogost, Ian, & Montfort, Nick (2009). *Platform studies: Frequently questioned answers*.
9
10 <https://escholarship.org/uc/item/01r0k9br>

11
12 Booth, Charles, & Rowlinson, Michael (2006). Management and organizational history:
13
14 Prospects. *Management & Organizational History*, 1(1), 5–30.

15
16
17 Bratton, Benjamin H. (2016). *The stack: On software and sovereignty*. MIT press.

18
19 Bresnahan, Timothy F., & Greenstein, Shane (1999). Technological competition and the
20
21 structure of the computer industry'. *The Journal of Industrial Economics*, 47(1), 1–40.

22
23 Chandler, Alfred D. (1977). *The visible hand*. Cambridge, MA: Harvard University Press.

24
25
26 Chen, Julie Y. (2020). The mirage and politics of participation in China's platform economy.
27
28 *Javnost - The Public*, 27(2), 154–170. <https://doi.org/10.1080/13183222.2020.1727271>

29
30
31 Chen, Julie Y., & Qiu, Jack L. (2019). Digital utility: Datafication, regulation, labor, and DiDi's
32
33 platformization of urban transport in China. *Chinese Journal of Communication*, 1–16.

34
35
36 Chen, Julie Y., & Sun, Ping (2020). Temporal arbitrage, the fragmented rush, and opportunistic
37
38 behaviors: The labor politics of time in the platform economy. *New Media & Society*.
39
40 <https://doi.org/10.1177/1461444820913567>

41
42
43 Conrad, Lisa (2019). Organization is the message: Gray media. In T. Beyes, L. Conrad, & R.
44
45 Martin (Eds.), *Organize* (pp. 63–87). Minneapolis, MN: University of Minnesota Press.

46
47 Cusumano, Michael A. (1985). *The Japanese automobile industry: Technology and management*
48
49 *at Nissan and Toyota*. Cambridge, MA: Harvard.

50
51
52 Cusumano, Michael A. (1991). *Japan's software factories: A challenge to US management*.
53
54 Oxford: Oxford University Press.

1
2
3 Cusumano, Michael A. (2010). *Staying power: Six enduring principles for managing strategy*
4 *and innovation in an uncertain world (lessons from Microsoft, Apple, Intel, Google,*
5 *Toyota and more)*. Oxford: Oxford University Press.

6
7
8
9
10 Cusumano, Michael A., Gawer, Annabelle, & Yoffie, David. B. (2019). *The Business of*
11 *platforms: Strategy in the age of digital competition, innovation, and power*. New York,
12 NY: HarperCollins Publishers.

13
14
15
16
17 Cusumano, Michael A., & Kentaro, Nobeoka (1998). *Thinking beyond lean: How multi-project*
18 *management is transforming product development at Toyota and other companies*. New
19 York, NY: Simon and Schuster.

20
21
22
23
24 Cusumano, Michael A., & Selby, Richard W. (1995). *Microsoft secrets—How the world's most*
25 *powerful software company creates technology, shapes markets, and manages people*.
26 New York, NY: The Free Press.

27
28
29
30
31 Davis, Gerald F. (2016). Can an economy survive without corporations? Technology and robust
32 organizational alternatives. *Academy of Management Perspectives*, 30(2), 129–140.

33
34
35 De Vaujany, Francois-Xavier, Leclercq-Vandelannoitte, Aurélie, & Holt, Robin (2019).
36 Communities versus platforms: The paradox in the body of the collaborative economy.
37 *Journal of Management Inquiry*, 1056492619832119.

38
39
40
41
42 Demil, Benoit, & Lecocq, Xavier (2006). Neither market nor hierarchy nor network: The
43 emergence of bazaar governance. *Organization Studies*, 27(10), 1447–1466.
44 <https://doi.org/10.1177/0170840606067250>

45
46
47
48
49 Dennis, Kingsley, & Urry, John (2009). *After the car*. London: Polity.

1
2
3 Dohse, Knuth, Jürgens, Ulrich, & Nialsch, Thomas (1985). From "Fordism" to "Toyotism"? The
4 social organization of the labor process in the Japanese automobile industry. *Politics &*
5
6 *Society*, 14(2), 115–146.
7
8
9

10 Doorn, Niels van (2017). Platform labor: On the gendered and racialized exploitation of low-
11 income service work in the ‘on-demand’ economy. *Information, Communication &*
12 *Society*, 20(6), 898–914. <https://doi.org/10.1080/1369118X.2017.1294194>
13
14
15
16

17 Doorn, Niels van (2020). At what price? Labour politics and calculative power struggles in on-
18 demand food delivery. *Work Organisation, Labour & Globalisation*, 14(1), 136–149.
19
20
21
22 JSTOR. <https://doi.org/10.13169/workorglaboglob.14.1.0136>
23

24 Du Gay, Paul (2003). The tyranny of the epochal: Change, epochalism and organizational
25 reform. *Organization*, 10(4), 663–684.
26
27

28 Fleming, Peter (2017). The human capital hoax: Work, debt and insecurity in the era of
29 Uberization. *Organization Studies*, 38(5), 691–709.
30
31
32

33 Flint, Jerry, & Tomarkin, Bob (1979). Wait 'til Next Year'. *Forbes*, Oct. 15, 1979, 51–55.
34

35 Gawer, Annabelle (2009). Platform dynamics and strategies: From Products to services'. In
36 Annabelle Gawer (Ed.), *Platforms, Markets and Innovation* (pp. 45–63). Cheltenham,
37 UK: Edward Elgar.
38
39
40
41

42 Gawer, Annabelle, & Cusumano, Michael A. (2002). *Platform leadership: How Intel, Microsoft,*
43 *and Cisco drive industry innovation*. Harvard Business Review Press.
44
45
46

47 Gawer, Annabelle, & Phillips, Nelson (2013). Institutional work as logics shift: The case of
48 Intel's transformation to platform leader. *Organization studies*, 34(8), 1035–1071.
49
50

51 Gillespie, Tarleton (2010). The politics of ‘platforms.’ *New Media & Society*, 12(3), 347–364.
52
53
54
55
56
57
58
59
60

- 1
2
3 Gramsci, Antonio (1971). Americanism and Fordism. In Q. Hoare & G. N. Smith (Eds.),
4
5 *Selections from the Prison Notebooks* (pp. 279–322). London: Lawrence & Wishart.
6
7
8 Gregg, Melissa (2018). *Counterproductive: A brief history of time management*. Durham, NC:
9
10 Duke Univ. Press.
11
12 Halberstam, David (1986). *The reckoning*. London: Bloomsbury.
13
14 Hall, Robert W. (1983). *Zero inventories*. Homewood, Ill.: Dow Jones-Irwin.
15
16
17 Hille, Kathrin, Inagaki, Kana, & Campbell, Peter (2021, May 17). Foxconn the carmaker?
18
19 Disruption in the era of electric vehicles. *Financial Times*.
20
21 <https://www.ft.com/content/b229250d-5d9e-4bb1-bb91-e57888233a98>.
22
23
24 Hines, Peter, Holweg, Matthias, & Rich, Nick (2004). Learning to evolve: A review of
25
26 contemporary lean thinking. *International Journal of Operations & Production*
27
28 *Management*, 24(10), 994–1011.
29
30
31 Holweg, Matthias (2007). The genealogy of lean production. *Journal of Operations*
32
33 *Management*, 25(2), 420–437.
34
35
36 Hoof, Florian (2020). *Angels of efficiency: A media history of consulting*. Oxford: Oxford
37
38 University Press.
39
40 Hoof, Florian, & Boell, Sebastian K. (2019). Culture, technology, and process in ‘media
41
42 theories’: Toward a shift in the understanding of media in organizational research.
43
44 *Organization*, 26(5), 636–654. <https://doi.org/10.1177/1350508419855702>
45
46
47 Imai, Kenichi (1994). Hajime ni [Preface]. *InfoCom REVIEW*, Winter, 3.
48
49
50 Kaneko, Jun, & Nojiri, Wataru (2008). The logistics of Just-in-Time between parts suppliers and
51
52 car assemblers in Japan. *Journal of Transport Geography*, 16(3), 155–173.
53
54
55
56
57
58
59
60

- 1
2
3 Kenney, Martin, & Florida, Richard L. (1993). *Beyond mass production*. Oxford: Oxford
4
5 University Press.
6
7
8 Kenney, Martin, & Zysman, John (2016). The rise of the platform economy. *Issues in Science*
9
10 *and Technology*, 32(3), 61–69.
11
12 Kenney, Martin, & Zysman, John (2020). The platform economy: Restructuring the space of
13
14 capitalist accumulation. *Cambridge Journal of Regions, Economy and Society*, 13(1), 55–
15
16 76. <https://doi.org/10.1093/cjres/rsaa001>
17
18
19 Kittler, Frederich A. (1999). *Gramophone, film, typewriter* (G. 1960- Winthrop-Young &
20
21 Michael. Wutz, Trans.). Stanford University Press; WorldCat.org.
22
23 <http://catdir.loc.gov/catdir/toc/cam028/98037243.html>
24
25
26 Kodama, Mitsuru (2003). Strategic innovation in traditional big business: Case studies of two
27
28 Japanese companies. *Organization Studies*, 24(2), 235–268.
29
30
31 Kokuryō, Jiro (1995). *Ōpun nettowāku keiei: Kigyō senryaku no shinchōryū [Open network*
32
33 *management: New trends in business strategy*. Tokyo: Nihon keizai shinbunsha.
34
35
36 Kokuryō, Jiro, & Platform Design Lab (Eds.). (2011). *Sōhatsu keiei no purattofōmu: Kyōdō no*
37
38 *jōhō kiban zukuri [Platforms for emergent management: Building the information basis*
39
40 *for cooperative work]*. Tokyo: Nihon keizai shinbunsha.
41
42
43 Latour, Bruno (1986). Visualisation and cognition: drawing things together. In H. Kuklick (Ed.),
44
45 *Knowledge and Society Studies in the Sociology of Culture Past and Present* (Vol. 6, pp.
46
47 1–40). Greenwich, Conn: Jai Press.
48
49
50 Liu, Alan (2004). *The laws of cool: Knowledge work and the culture of information*. Chicago:
51
52 Chicago University Press.
53
54
55
56
57
58
59
60

1
2
3 Lovink, Geert (2021). Notes on the platform condition. *Making and Breaking*, 2.

4
5 <https://makingandbreaking.org/article/notes-on-the-platform-condition/>

6
7
8 Lovink, Geert, & Apprich, Clemens (2017). Foreword. In *Technotopia: A media genealogy of*
9
10 *net cultures* (pp. xii–xix). London: Rowman & Littlefield.

11
12 Marutschke, David (2011). *Continuous improvement strategies: Japanese convenience store*
13
14 *systems*. Basingstoke: Palgrave Macmillan.

15
16
17 McLuhan, Marshall (1994). *Understanding media: The extensions of man*. Cambridge, MA: MIT
18
19 press.

20
21 Meyer, Marc H., & Lehnerd, Alvin P. (1997). *The power of product platforms: Building value*
22
23 *and cost leadership*. New York: Free Press.

24
25
26 Mike, Danilovic, Mats, Winroth, Javier, Ferrandiz, & Oriol, Josa (2007). Platform thinking in the
27
28 automotive industry—managing the dualism between standardization of components for
29
30 large scale production and variation for market and customer. *POMS 18th Annual*
31
32 *Conference-Product Innovation and Technology Management*.

33
34
35 Moreno, Johan (2019). ‘Google Follows A Growing Workplace Trend: Hiring More Contractors
36
37 Than Employees’, *Forbes*, 31 May.
38 [https://www.forbes.com/sites/johanmoreno/2019/05/31/google-follows-a-growing-](https://www.forbes.com/sites/johanmoreno/2019/05/31/google-follows-a-growing-workplace-trend-hiring-more-contractors-than-employees/?sh=7692b213447f)
39 [workplace-trend-hiring-more-contractors-than-employees/?sh=7692b213447f](https://www.forbes.com/sites/johanmoreno/2019/05/31/google-follows-a-growing-workplace-trend-hiring-more-contractors-than-employees/?sh=7692b213447f).

40
41 Nakamura, Lisa (2014). Indigenous circuits: Navajo women and the racialization of early
42
43 electronic manufacture. *American Quarterly*, 66(4), 919–941.

44
45
46 Napoli, Philip, & Caplan, Robyn (2017). Why media companies insist they’re not media
47
48 companies, why they’re wrong, and why it matters. *First Monday*.

49
50 Natsuno, Takeshi (2003). *I-mode Strategy*. New York: John Wiley and Sons.

- 1
2
3 Negoro, Tatsuyuki, & Kimura, Makoto (1999). *Netto bijinesu no keiei senryaku: Chishiki kōkan*
4 *to baryūchēn [Management Strategies of Net Business: Knowledge Exchange and Value*
5 *Chains]*. Tokyo: Nikka giren.
6
7
8
9
10 Negoro, Tatsuyuki, & Ajiro, Satoshi (2012). An outlook of platform theory research in business
11 studies'. *Waseda Business and Economic Studies*, 48, 1–29.
12
13
14 Ohno, Taiichi (1988). *Toyota production system: Beyond large-scale production*. Productivity
15 Press.
16
17
18
19 Ouchi, William G. (1980). Markets, bureaucracies, and clans. *Administrative Science Quarterly*,
20 129–141.
21
22
23
24 Parker, Geoffery G., & Van Alstyne, Marshall W. (2005). Two-sided network effects: A theory
25 of information product design. *Management Science*, 51(10), 1494–1504.
26
27
28
29 Parker, Mike, & Slaughter, Jane (1990). Management-by-stress: The team concept in the US
30 auto industry. *Science as Culture*, 1(8), 27–58.
31
32
33 Pasquale, Frank (2016). Two narratives of platform capitalism. *Yale L. & Pol'y Rev*, 35, 309.
34
35
36 Plantin, Jean-Christophe, Lagoze, Carl, Edwards, Paul N., & Sandvig, Christian (2018).
37 Infrastructure studies meet platform studies in the age of Google and Facebook. *New*
38 *Media & Society*, 20(1), 293–310.
39
40
41
42 Qiu, Jack L., Gregg, Melissa, & Crawford, Kate (2014). Circuits of labour: A labour theory of
43 the iPhone era. *TripleC: Communication, Capitalism & Critique. Open Access Journal*
44 *for a Global Sustainable Information Society*, 12(2), 564–581.
45
46
47
48
49 Ries, Eric (2014). *The lean startup: How today's entrepreneurs use continuous innovation to*
50 *create radically successful businesses*. New York: Crown Business.
51
52
53
54 Rochet, Jean-Charles, & Tirole, Jean (2003). Platform competition in two-sided markets.
55
56
57
58
59
60

- 1
2
3 *Journal of the European Economic Association*, 1(4), 990–1029.
- 4
5 Rosenblat, Alex, & Stark, Luke (2016). Algorithmic labor and information asymmetries: A case
6
7 study of Uber's drivers. *International Journal of Communication*, 10, 27.
- 8
9
10 Salazkina, Masha (2015). Introduction: Film theory in the age of neoliberal globalization.
11
12 *Framework: The Journal of Cinema and Media*, 56(2), 325–349.
- 13
14 Sayer, Andrew (1986). New developments in manufacturing: The just-in-time system. *Capital &*
15
16 *Class*, 10(3), 43–72.
- 17
18
19 Scholz, Trebor (2017). *Uberworked and underpaid: How workers are disrupting the digital*
20
21 *economy*. Cambridge, UK: Polity Press, 2017.
- 22
23
24 Schonberger, Richard (1982). *Japanese manufacturing techniques: Nine hidden lessons in*
25
26 *simplicity*. New York, NY: Simon and Schuster.
- 27
28 Sherman, Stephanie (2020). Why Lenin was a fan of Ford. In Bratton, Benjamin H, Boyadjiev,
29
30 Nicolay and Axel, Nick (Ed.), *The New Normal* (pp. 406-410). Moscow: Strelka.
- 31
32
33 Srnicek, Nick (2016). *Platform capitalism*. Cambridge, UK: Polity Press.
- 34
35 Srnicek, Nick (2017). The challenges of platform capitalism: Understanding the logic of a new
36
37 business model. *Juncture*, 23(4), 254–257.
- 38
39
40 Steinberg, Marc (2019). *The platform economy: How Japan transformed the consumer Internet*.
41
42 Minneapolis, MN: University of Minnesota Press, 2019
- 43
44 Steinberg, Marc, & Zahlten, Alexander (Eds.). (2017). *Media theory in Japan*. Durham: Duke
45
46 University Press.
- 47
48
49 Thrift, Nigel (2005). *Knowing capitalism*. London: Sage.
- 50
51 Tsutsui, William M. (2001). *Manufacturing ideology: Scientific management in twentieth-*
52
53 *century Japan*. Princeton, N.J.: Princeton University Press, 2001.
- 54
55
56
57
58
59
60

- 1
2
3 Urry, John (2004). The 'system' of automobility. *Theory, Culture & Society*, 21(4–5), 25–39.
- 4
5 Van Alstyne, Marshall W., Parker, Geoffery G., & Choudary, Sangeet P. (2016). Pipelines,
6
7 platforms, and the new rules of strategy. *Harvard Business Review*, 94(4), 54–62.
- 8
9
10 Van Dijck, José, Poell, Thomas, & De Waal, Martijn (2018). *The platform society: Public values*
11
12 *in a connective world*. New York, NY: Oxford University Press, 2018.
- 13
14
15 Vismann, Cornelia (2008). *Files: Law and media technology* (Geoffery Winthrop-Young,
16
17 Trans.). Stanford, Calif.: Stanford University Press, 2008.
- 18
19
20 Wheelwright, Steven C. & Clark, Kim B. (1992). Creating project plans to focus product
21
22 development. *Harvard Business Review*, 70(2), 70–82.
- 23
24
25 Whitford, Josh, & Zirpoli, Francesco (2016). The network firm as a political coalition.
26
27 *Organization Studies*, 37(9), 1227–1248.
- 28
29
30 Williams, Raymond (2003). *Television: Technology and cultural form*. Psychology Press.
- 31
32
33 Womack, James P., Jones, Daniel T., & Roos, Daniel (1990). *The Machine that changed the*
34
35 *world*. New York: Free Press.
- 36
37
38 Wood, Ellen Meiksins (2002) *The origin of capitalism : A longer view*. London: Verso
- 39
40
41 World Auto Trade: Current Trends and Structural Problems; Hearings before the Subcommittee
42
43 on Trade of the Committee on Ways and Means, House of Representatives, Ninety-Sixth
44
45 Congress, Second Session. (1980). *March*, 7, 18,.
- 46
47
48 Yamada, Mashiko (2010). The current issues on foreign workers in Japan. *Japan Labour Review*,
49
50 7(3), 5–18.
- 51
52
53 Yoffie, David B., & Cusumano, Michael A. (1998). *Competing on Internet time: Lessons from*
54
55 *Netscape and its battle with Microsoft*. New York, NY: Free Press.
- 56
57
58
59
60

1
2
3 Zhang, Lin (2020). When platform capitalism meets petty capitalism in China: Alibaba and an
4
5 integrated approach to platformization. *International Journal of Communication*, 14,
6
7 114–134.
8
9

10 Zuboff, Shoshana (2019). *The age of surveillance capitalism: The fight for a human future at the*
11
12 *new frontier of power*. New York: PublicAffairs.
13
14
15
16
17
18
19
20

21 Biography

22
23 Marc Steinberg is Associate Professor of Film Studies at Concordia University, Montreal, and
24 director of The Platform Lab. He is the author of the monographs *Anime's Media Mix:*
25 *Franchising Toys and Characters in Japan* (University of Minnesota Press, 2012), *The Platform*
26 *Economy: How Japan Transformed the Commercial Internet* (University of Minnesota Press,
27 2019), and, with Rutvica Andrijasevic, Julie Yujie Chen and Melissa Gregg, *Media and*
28 *Management* (University of Minnesota Press, 2021). He is also the co-editor of *Media Theory in*
29 *Japan* (Duke University Press, 2017). His work has appeared in the journals *Asiascape: Digital*
30 *Asia*; *Social Media + Society*; *Journal of Visual Culture*; *Theory, Culture & Society*, among
31
32 others.
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Figures

Toyotist automobile production (1950s~)	Platform Capitalism (2000~)
Automobile industry built around stack (started with Ford; further developed by GM and then Toyota)	Stack model of platform for computers or social media sites
Term <i>platform</i> used in relation to base or chassis as of late 1970s	Term <i>platform</i> used in relation to computers in 1990s, and social media sites as well as digital intermediaries as of the 2000s
Production of cars based on Toyotist plant as hub or intermediary; most production of parts is outsourced	Intermediary model of the platform is dominant in descriptions of platform capitalism
Subsidiary and sourcing firms use temp or just-in-time labor model	Temp or just-in-time labor model dominates
Toyota gathers data on production and consumption, modifying production plans based on consumer data as gathered by salespeople	Platforms are data-intensive and data-dependent; they gather data to optimize production (Netflix), search results (Google), or driver paths (Uber)
Production starts when an order is placed; Toyota ramps up or down production as needed; just-in-time is the model	Production or service-provision starts when an order is placed; on-demand is the model
Toyota outsources risk (and storage) to suppliers, expecting immediate delivery of parts	Uber outsources risk (and wait times) to drivers, expecting immediate delivery of service

Figure 1: Parallels between the Toyota Production System and platform capitalism.

Michael Cusumano / US Platform Theory	Kokuryō Jirō / Japanese Platform Theory
Starts with automobile analysis in 1980s-90s	Starts with concern over changes in company organization and industrial organization due to new communications technologies, mid-1990s
Automobile analysis informs “product platform” analysis that offers computers as one example	Kokuryō combines a stack model of platform (one business builds base for another) and intermediary model (enabling transactions between third parties)
Cusumano shifts to software and then platform analysis during 1990s and 2000s, publishing <i>Platform Leadership</i> in 2002	Automobile parts supplier Misumi is one case study; Aucnet used car auction another
Cusumano and Gawer (2002) introduce the complementors model of the intermediary, explaining dominance of Microsoft with its ‘ecosystem’ approach	Background of digital platform theory are Japanese automobile companies and the existing structure of the Japanese industrial system
Becomes a leading voice in articulating platform economy in U.S.	Becomes leading voice in articulating platform economy in Japan

Figure 2: Summary of the distinct trajectories of platform theory in the US and Japan.