

Escaping Platform Ecosystem Myopia: The Importance of Second-Order Ecosystems

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ABSTRACT

Platform ecosystems have become dominant structures shaping a range of markets. Despite the increasing research attention placed on platforms and their ecosystems, the basic model comprising the platform and its sides does not consider the constellation of firms that has emerged to assist complementors in creating and capturing value. We define these actors as composing a “second-order ecosystem” (SOE). SOE actors provide a variety of services to complementors on a particular platform to improve their performance. Their innovations create strategic challenges for the platform and indirectly affect the whole ecosystem's evolution. We explain the origins and function of SOEs and discuss the multivalent impacts they have on the positions and strategies of complementors, platform owners, and other side(s). We close by identifying future research directions

I. Introduction

Over the past three decades, digital platforms have become significant forces in an increasing number of industries and economic sectors, developing into the dominant institutional form of the digital age (Gawer, 2021a; Kretschmer et al., 2022). Consequently, platforms and associated ecosystems are now at the center of a field of research that has concentrated on the strategic questions confronting the platform firm and the primary actors that constitute what Altman, et al. (2022) define as the “managed ecosystem”.¹ Specifically, scholarly enthusiasm for platforms has stimulated a rapidly growing body of research on how platforms emerge, compete, and achieve dominance (Boudreau, 2010; Chen et al., 2022a; Cusumano et al., 2019, Eisenmann et al., 2011; Gawer, 2014; Jacobides et al., 2018; Parker et al., 2016; Rietveld & Schilling, 2021; Tiwana, 2014), and, more recently, on the strategic challenges faced by complementors as they interact with or through the platform to deliver their offerings to users (Cenamor, 2021; Chen et al., 2022b; Cutolo & Kenney, 2021; Nambisan & Baron, 2019).

However, the narrow conceptualization of platform-organized economic spaces overlooks the emergence and strategic relevance of an increasingly large and heterogeneous population of actors that focus their business specifically on catering to complementors' needs. Consider the case of Airbnb. In response to the operational and strategic challenges faced by the hosts, a remarkable proliferation of firms materialized to provide a wide variety of services ranging from guest check-in and cleaning to more complex and specialized services such as data analytics and various software programs (Sigala, 2018). This paper discusses the general phenomenon characterizing

¹ Despite the greater consistency among platform scholars on the elements posited as constituting a platform ecosystem, namely the platform firm, the complementors whose value-creating interactions are enabled and mediated by the platform, and the users (e.g., Ceccagnoli et al., 2012; Cennamo and Santaló, 2013; Wareham et al., 2014), extant research in strategic management and entrepreneurship tends to focus exclusively on the interaction between the platform owner and its complementors (e.g., Gawer & Cusumano, 2002; Gawer & Henderson, 2007; Jacobides et al., 2018).

the organic emergence—independent of platforms' architecture and design choices—of actors that support complementors in value-creating and capturing activities. We term this community of actors as forming a "second-order ecosystem" (SOE).²

Recognizing the existence of SOEs and their impacts on platform dynamics is crucial for a more nuanced understanding of the strategic environment within which both the platform owners and complementors operate. SOEs serve complementors with a rich and diverse set of specialized services such as platform-specific consulting and market insights, or support in manufacturing, distribution, financing, and advertising. These activities directly improve how complementors structure and run their businesses on the platform, thereby increasing their capabilities to generate value on the platform and for the platform. Moreover, although SOEs operate outside the traditional boundaries and rules set by the platform, their innovations and business models may also, indirectly, alter the relationships between complementors and the platform firm, and even shape the evolutionary dynamics of the platform ecosystem itself.

To illustrate how SOEs might affect the platform firm and its ecosystem, we return to the Airbnb example. The appearance of property-management services for Airbnb hosts professionalized the rental process, improved the guest experience, and simplified the hosts' activities, thereby attracting many more properties to Airbnb, allowing it to become the largest hospitality service in the world. On the other hand, they also provided software solutions to reduce the friction of listing properties on multiple platforms, diminishing the distinctiveness of Airbnb's offerings vis-à-vis its other competitors (e.g., VRBO) and weakening Airbnb's grip over the hosts. These services also shaped Airbnb's business model, as one of the company's responses was to

² A number of platforms have additional sides (e.g., advertisers, delivery drivers) around which may emerge another separate SOE. We are treating them as separate from the complementor-side SOEs but occupying theoretically similar roles and having similar effects on the platform and the other ecosystem participants.

acquire several of these property-management services to integrate their technology and service into the Airbnb platform.

Despite this economic and strategic relevance for platform dynamics, the SOE phenomenon has gone unnoticed in the extant research on platforms and related ecosystems. This oversight limits our ability to fully understand the processes and mechanisms by which SOEs affect complementors' value-creation activities, the relationship between the platform and complementors, and ultimately the evolution of platforms' strategy and structure.

To address this issue, we advance a more comprehensive model of platforms by theorizing on the origins and function of SOEs within platform-managed ecosystems. Our work promises to enhance understanding of all platform participants' positions, operations, relationships, and strategies by illustrating SOEs' multivalent and evolving impacts on them. Finally, we highlight how SOEs necessarily reframe the ongoing conversation on platforms, drawing upon this new framework to outline a future research agenda on the topic.

I. Background literature

Management research on platforms and related ecosystems has advanced rapidly over the last decade (Adner, 2017; Hou & Shi, 2021; Jacobides et al., 2018; McIntyre & Srinivasan, 2017), dominated by three distinct theoretical perspectives: one inspired by industrial economics (Evans, 2003; Rochet & Tirole, 2003), another from technological design (Baldwin & Clark, 2000; Sanchez & Mahoney, 1996), and the third embracing an inter-organizational lens (Gulati et al., 2012).

These three perspectives have conceptualized a platform ecosystem either as multi-sided markets whose existence depends on platform firms' ability to recruit two or more distinct groups of users and mediate their transactions (Evans & Schmalensee, 2016), as modular technological

architectures that enable the emergence of an ecosystem of peripheral complementary product/service providers (Baldwin & Woodard, 2009), or as new organizational structures for value creation and capture characterized by functional interdependencies and power asymmetries between complementors and platforms (Altman et al., 2022; Gawer, 2014; Kretschmer et al., 2022; Stark & Pais, 2021).

Across these perspectives, the fundamental theoretical model represents platform ecosystems as organizational phenomena constructed and managed by a platform firm and encompassing only the actors whose actions and relationships are directly intermediated by that firm (Altman et al., 2022; Jacobides et al., 2018; Kretschmer et al., 2022). Consequently, ecosystem dynamics are framed and discussed with the assumption that the ecosystems' boundaries, membership, and roles are determined almost entirely by the platform owner's design choices, which de facto determine the structure of action within the ecosystem, i.e., its participants and their relationships (Adner, 2017, Gawer 2021; Iansiti & Levien, 2004; Jacobides et al., 2018, Kretschmer et al., 2022). And yet, as scholars have started incorporating the complementors' perspective into this model (Cenamor, 2021; Cutolo & Kenney, 2021; Hänninen & Smedlund, 2021; Nambisan & Baron, 2019), it has become evident that this narrow conceptualization of platform-organized economic spaces omits an increasingly large population of specialized service providers that have emerged to assist complementors operating in the platform-managed ecosystem (Altam et al., 2021).

Shifting the focus from the platform firm to the complementors shows that they operate in a field of competition that is increasingly complex (Cenamor, 2021), conditioned by pervasive uncertainty (Curchod et al., 2020; Nambisan & Baron, 2019),³ and structured in ways that are

³ Note that this uncertainty includes but is not limited to conventional Knightian uncertainty (Knight, 1921; McMullen & Shepherd, 2005; Shane & Venkatraman, 2000): much of the platform uncertainty is endogenous, self-interested, and opaque as it is generated by the actions and reactions of the platform firm that sets and modifies the terms of

meant to serve the platform’s goals and interests (Altman et al., 2021; Boudreau & Hagiu, 2009; Chen et al., 2022; Cutolo & Kenney, 2021). As a platform’s managed ecosystem grows and matures, complementors must deal with increasingly challenging competitive dynamics (Boudreau, 2012; Cenamor, 2021) and power asymmetries that limit their strategic flexibility and affect their performance (Aguiar & Waldfogel, 2021; Cutolo et al., 2021; Jacobides & Lianos, 2021; Rietveld et al., 2020).

If one recenters the focus on the complementors, it becomes evident that an evolving community of specialized service providers has emerged as an entrepreneurial response to the operational and strategic opportunities that have arisen from the unique needs of the complementors operating in platform-managed ecosystems. We call this emergent community of providers a platform's second-order ecosystem as it serves the needs of one or more sides of the primary platform ecosystem. These emergent constellations of actors are depicted in Figure 1.

Figure 1 about here

We describe the SOE as a phenomenon—a distinct, emergent, and significant aspect of modern platforms and related ecosystems. Distinct in that we can define SOEs as a construct with a distinct population, characteristics, and boundary conditions, emergent in that the properties these SOEs (and that of the entities that constitute them) manifest are the result of opportunities that materialize, and significant in that these ecosystems shape the nature and performance of complementors, of platform firms, and of the ecosystem itself. In what follows, we build on and extend the existing platform and ecosystem research by developing the concept of SOEs.

engagement for all the participants (Boudreau & Hagiu, 2009; Curchod et al., 2020; Cutolo & Kenney, 2021; Nambisan & Baron, 2021).

II. Second-Order Ecosystems

Theoretical constructs are “conceptual abstractions of phenomena that cannot be directly observed” and have been established for purposes of scientific observation and explanation (MacCorquodale & Meehl, 1948; Suddaby, 2010: 346). While clear constructs are not a substitute for theory (Sutton & Staw, 1995), they are the building blocks of strong theory and a vital early step in theory construction. The construct of SOEs represents an abstraction not of the actors involved but rather of its quality as a distinct, emergent, and significant aspect of digital platform ecosystems. Clear constructs require a precise, yet parsimonious definition, that allows categorical distinctions between them and other concepts and well-articulated scope conditions, or contextual circumstances within which such constructs apply (or not). This section explicates each with regard to SOEs.

Distinct. SOEs are distinct populations with common characteristics that reflect *dedicated strategies, capabilities, and resources focused on serving the needs of a platform side, most often the complementors, that are participating in a particular platform ecosystem*. This definition includes firms dedicated to serving complementors within a single platform, such as rental-management services that serve landlords using Airbnb (e.g., AirConcierge), firms providing mobile app data and analytics for developers on the App stores (e.g., AppAnnie), or talent and marketing agencies for social media influencers (e.g., Famebit). It also includes larger firms that have built dedicated products and services addressing the needs of complementors on a particular platform or category of platforms. For instance, Shopify has become an SOE actor within the Amazon ecosystem, as its ordering, fulfillment, and data-analytics services integrate with the Amazon platform to offer complementors the option to implement a multi-channel strategy. In other cases, it is complementors who, in their praxis, identify a product/service that would be of

value to other complementors. To illustrate, many successful YouTubers turned their experiences into structured online courses where they teach newcomers how to build and grow a YouTube channel. The diversity of platforms, complementors on each platform, and goods and services SOE actors provide make an exhaustive inventory of SOE actors beyond the scope of this paper.⁴

Emergent. Importantly, this evolution of platform ecosystems into much more complex webs including the SOE firms is only partially the product of explicit choices made by platform architects. SOEs are neither designed nor directly managed by platform firms (Altman et al., 2021). Instead, SOE actors and their services are entrepreneurial responses to the opportunities created by the needs of complementors and their relationship with the platform. They resemble a classical ecological ecosystem in that they are communities of loosely coupled actors characterized by their co-evolutionary dynamics with complementors and the platform firm in ways that foster adaptation and change. SOEs typically emerge from and co-evolve with the unique properties of the particular ecosystem within which they operate and which, as we discuss later, they affect.

Significant. Finally, SOEs are theoretically significant in explanations of the nature, performance, and evolution of complementors, platform firms, and the platform managed ecosystems as a whole. This is because the business practices SOE actors introduce can facilitate adaptations of the existing configuration of ecosystem dynamics. In serving complementors, SOE actors have *direct* impacts on their performance as they make available knowledge and services that support complementors in their value creation and capture goals (Sigala, 2018; Zhang et al.,

⁴ In addition to a clear definition, the scope conditions of a theoretical construct are the parameters that define which empirical phenomena fit within the construct and which do not (Walker & Cohen, 1985). For SOEs to serve as a useful construct in identifying and investigating a particular empirical phenomenon, the conditions under which this construct applies require clarification. SOEs may be distinguished from those firms that provide undistinguished goods and services to complementors within a platform. For example, complementors on YouTube or Instagram use a camera to capture and a computer to edit and publish their content. To the extent that software and hardware companies have not developed specific goods and services addressing the particular needs of such complementors, they would not represent SOE actors.

2022). In addition to improving performance, SOE actors can also mitigate some of the power asymmetries that complementors experience vis-à-vis the focal platform (Cutolo & Kenney, 2021; Jacobides & Lianos, 2021).

The existence of SOEs also has important *indirect* implications for other ecosystem participants. SOE firms can improve the performance of the platform firm. For example, by brokering best practices among complementors, SOE actors can support the platform's efforts and speed the diffusion of product and process innovations (e.g., Bishop, 2020). Moreover, SOE firms may improve a given platform relative to competing platforms by lowering the cost of entry for complementors to join and/or by reducing failure rates among existing complementors (e.g., Sigala, 2018). Conversely, in other cases, the activities of one or more SOE actor can even threaten a platform's competitive position by weakening the platform's hold on the complementors or even increase the ability of competing platforms to "poach" the platform's complementors. Similarly, SOEs may benefit other platform side(s) when they improve the complementors' offering quality and characteristics, but they can also deceive and harm another side(s) or even the platform itself. To illustrate, the booming market for fake reviews generates bad information that can result in actors on another side(s) making non-optimal decisions (He et al., 2022; Tadelis, 2016; Wu et al., 2022).

To summarize, large platform ecosystems can foster a proliferation of SOE actors offering a remarkable variety of services or products to complementors that can powerfully impact, in strategically significant ways, the competitive and evolutionary dynamics within platform managed ecosystems. In the next section, we discuss the effects SOE actors can have on the various platform ecosystem actors and provide illustrative examples from a range of platforms.

III. The Effects of Second-Order Ecosystems on Platform Dynamics

Despite the ease of entry and tremendous business opportunities for complementors (Dushnitsky & Stroube, 2021), competitive dynamics on platforms are characterized by two dominant issues: increasingly complex competitive dynamics (Boudreau, 2012; Cennamor, 2021; Kapoor & Agarwal, 2017; Rietveld & Eggers, 2018) and the difficulties of operating under conditions of asymmetric power relationships with the platform firm (Balsinger et al., 2022; Curchod et al., 2020; Cutolo et al., 2021; Nambisan & Baron, 2021; Rietveld et al., 2020).

SOEs emerged organically to serve complementors in competing more effectively against other complementors and navigating the uncertainties and the risks of platform ecosystems. Initial studies found that these services affect the complementary product markets and hence the whole ecosystem (Sigala, 2018) and suggested that further research would help the field to better understand how these new yet already important market structures emerge, grow, and evolve over time (Thomas et al., 2022). In this section, we discuss some of the impacts that SOE actors have on platform ecosystem actors. We divide these impacts between *direct* effects on the complementors and the *indirect* effects on the platform firms and the other side(s) of the platform. As we will demonstrate, the effects of SOE actors individually on complementors and platform firms and collectively on the ecosystem may vary from inconsequential to existential.

III.a - Direct Effects of SOE Actors on Complementors

The focal relationship for SOE actors is between individual SOE actors and a complementor. As discussed previously, these are primarily traditional buyer-supplier relations, as SOEs are independent actors providing specific resources and services that enable complementors to operate more effectively. SOE offerings vary by platform and by the distinctive niches of the complementors within a given platform ecosystem (for example, content creators, sellers, app

developers, etc.), and this diversity reflects the evolving needs of the complementors and the organic nature of the SOE actors that emerge to service them. However, SOE services respond to the two fundamental dimensions of platform competition: competing with other complementors and managing the risks that stem from the power asymmetries endemic to these competitive arenas. Returning to the Shopify example, in presenting its services to Amazon complementors, the company touts their ability to help complementors address these two principal functions, emphasizing the opportunity for complementors to improve their competitiveness via increased buying features and mitigate platform-specific risks by enabling their ability to multi-home. To quote from the Shopify website⁵:

[Shopify] gives ecommerce businesses a unique opportunity. You can use Amazon to sell certain products and help improve brand awareness, as well as create an online store where you control the experience and the data, and save money on fees. Use both a branded web store and marketplaces to complement each other. This reduces customer dependency on a single sales channel but also provides customers an option for additional discoverability and buying features.

Thus, in developing our theoretical framework, we focus on these two fundamental dimensions of the direct effects of SOE actors on complementors: improving complementors' individual competitiveness within the platform ecosystem and mitigating individual complementors' platform-specific risks.

Competing more effectively within the platform ecosystem

Platform managed ecosystems are fiercely competitive environments for complementors due to numerous interrelated complexities, such as the remarkable number and variety of competitors,

⁵ <https://www.shopify.com/blog/sell-on-amazon>. Accessed on 04/16/2022

often crowded into very narrow categories (Boudreau, 2012; Kapoor & Agarwal, 2017), the rapid pace of technological and governance changes at the platform level (Chen et al., 2022a; Rietveld et al., 2020), and the underlying heterogeneity in the platform user base (Panico & Cennamo, 2020; Rietveld & Eggers, 2018). While digital platforms provide complementors with many resources to create value within the ecosystem (Ghazawneh & Henfridsson, 2013), these highly standardized resources make it difficult to gain and sustain competitive advantage because they do not regard the evolving complexity and specificity of the challenges that individual complementors face (Foerderer et al., 2019; Hein et al., 2019), how competitive dynamics evolve as the platform ecosystem matures (Boudreau, 2012; Cenamor, 2021; Panico & Cennamo, 2020; Rietveld & Eggers, 2018), or how these resources are organized to encourage complementor behavior favorable to the platform (Ghazawneh & Henfridsson, 2013).

SOEs alleviate what can be seen as a market failure by offering specialized consulting, products or services that improve complementors' process capabilities or product offerings, enabling them to operate more effectively on the platform. These offerings may directly address the challenges complementors face in serving customers or developing their complementary products (Kapoor & Agarwal, 2017; Ozalp et al., 2018). For instance, some SOE actors develop and sell algorithmic pricing services to complementors on platforms such as Amazon and Airbnb (Harrington, 2022; Johnson et al., 2020). Other organizations, termed "multichannel networks" (MCNs), offer promising YouTubers various services including assisting in audience development, content programming, editing services, creator collaborations, digital rights management, monetization, and/or sales (Gardner & Lehnert, 2016).

In other cases, SOE offerings can augment complementors' capacity to create value. As we mentioned earlier, third-party providers of specialized data such as AppAnnie or SocialBlade have

emerged and offer the complementor information on how to identify potential users or target profitable market segments. These data providers mitigate the disadvantages that accrue when platforms own all of the data and only provide complementors data that is in the platform's interest for the complementors to have (Clough & Wu, 2022; Gregory et al., 2021). This has resulted in an increasing number of data-provision businesses that scrape the websites or use the platform's APIs to collect and analyze platform-specific data that, when aggregated and analyzed, can be of value to the complementors. To illustrate, specialized actors termed "Mobile Intelligence Providers" compile data from the app stores that complementors can use to track progress, create release strategies, and benchmark themselves against competitors. Similarly, in the hotel industry, third-party providers of revenue-management software take advantage of the platforms' technological architecture to provide complementors with data-management and analysis services (Balsinger et al., 2022).

Because the SOE is composed of a diverse population of largely unregulated actors, not surprisingly, some SOE actors have emerged that, while operating within the technical parameters of the platform, assist complementors in manipulating the platform affordances to gain an advantage over other complementors (Petre et al., 2019). For instance, there are thriving markets for services that provide positive reviews of complementors' products/services⁶ (He et al., 2022; Wu et al., 2022), and it is also possible to hire SOE actors to mount attacks meant to sabotage competitors' businesses with negative reviews (Hunt, 2015; Zhang et al., 2016) or even use bots to artificially increase click-throughs and engagement, thereby leading the platforms' algorithms to detect and punish "detected" rule violations (for example, Nguyen, 2021).

⁶ This included any other measures implemented to increase complementors' reputation within the ecosystem—e.g., there are "click farms" from which a musician on Spotify can buy "listens" that increase their visibility and performance metrics (Drott, 2020).

Mitigating platform-specific risks

Platform-organized markets are, by nature, precarious for complementors (Curchod et al., 2020; Nambisan & Baron, 2021), and conditioned by the contradictory logics and power asymmetries that characterize the relationship between complementors and the platform owner. Complementors are vulnerable to the actions of the platform and have incentives to adopt strategies to mitigate its power over them (Balsinger et al., 2022; Cutolo et al., 2021; Wen & Zhu, 2019; Zhu & Liu, 2018). As complementors grappled with the risks intrinsic to platform managed ecosystems, SOEs emerged to provide services that directly improve complementors' ability to respond to platform-specific risks. The impact of SOE actors on this tension between the platform and complementors is illustrated by the three different types of support provided to reduce their complementors' dependence on the platform.

The first support type consists of services that make it possible for complementors to generate off-platform income streams, thereby weakening the control that the platform has over its complementors (Hagiu & Wright, 2021; Wang & Miller, 2019). For example, Patreon was established by two entrepreneurs to create alternative income streams for YouTubers and, more recently, Instagram influencers. As an SOE actor, Patreon enables artists and influencers to "port" the audience they develop on the focal platform to other sites where they can offer exclusive content, community, and deeper engagement (Gu & Zhu, 2020; Zhou et al., 2021). As a result, they help to loosen the control that the focal platform has over the complementors. Another example is Famebit, which created a platform that allows advertisers to connect directly with potential influencers to sponsor product placements in their YouTuber's videos (Burgess & Green, 2018).

Second, SOE actors can also provide mechanisms for complementors to multi-home, i.e., operating on multiple platforms. Cross-platform development and placement often presents a major challenge for complementors, as it can require significant investment (i.e., specialization) at both the product and platform ecosystem level (Anderson et al., 2014; Tavalei & Cennamo, 2021; Tiwana, 2014). SOE-developed services can lower the barrier to offering similar products on different platforms (Chen et al., 2022; Kapoor & Agarwal, 2017), and/or different channels (Wang & Miller, 2019). These products or services range from interface software to individual consulting services that can reduce the costs of and assist complementors in successfully diversifying platforms. To illustrate, the startup Mechdome developed a conversion tool for app developers that automatically ports Android apps to Apple iOS and OS X apps without needing to learn how to use the integrated development environments or application programming interfaces.

Third, SOE actors can provide guidance on how to leverage the system of algorithms that govern the platform markets (Bishop, 2020; Cutolo et al., 2021). The central intermediation, yet opacity, of algorithms in managed ecosystems shapes the relationships between complementors and their market (customers, users, viewers, etc.), and between them and the platform firm (Altman et al., 2021; Curchod et al., 2020; Stark & Pais, 2021). In response to such opportunities, SOE actors have emerged and developed specialized knowledge about various aspects of the platform's operation. For example, social media consultants emerged to help content creators design appropriate hashtag strategies to improve visibility, appeal demonetization or bans, and advise on a myriad of other platform-specific issues.

Of course, in such unregulated and opaque environments, SOE services do not always deliver their promised benefits. For instance, given the hazy line between what platforms deem illegitimate manipulation and legitimate strategy (Petre et al., 2019), there is an entire netherworld that assists

SOE actors in undertaking practices that violate platform policies (Wu et al., 2020). Moreover, and not surprisingly, in such unregulated and often anonymous marketplaces, there are predatory consultants and suppliers who take advantage of the complementors.

Given the Kafkaesque opacity of platform-organized markets within which both the technical and contractual rules of operation can be changed suddenly and without warning (Caplan & Gillespie, 2020; Eaton et al., 2015) and the mostly unregulated nature of the SOE, there is ample space for opportunistic behavior by unscrupulous or incompetent SOE actors. To illustrate, the *New York Times* reported that there are a growing number of “Instagram gurus” that sell mentorship or classes that promise to help complementors achieve success, that are, in fact, predatory.⁷

As we have described in this section, SOE services support the complementors in competing more effectively and mitigating their vulnerability. However, the impacts of SOE actors can also extend to the other ecosystem actors. On one hand, SOEs can reinforce the platform’s business model and improve the quality of its offering to users. And yet, on the other hand, their services may weaken or even negate the control a platform has over its complementors. Obviously, in these latter cases the SOE actor can threaten the platform’s business model and can elicit a variety of strategic responses from the platform’s owner. In the next section we will discuss the dimensions of these indirect effects.

III.b - Indirect Effects of SOE Actors

The services that SOEs provide not only affect the complementors, but also can impact the focal platform and the other platform side(s). As was the case regarding the direct effects on

⁷ Herrman, J. 2021. Is There a Secret to Success on Instagram? *New York Times* (January 26) <https://www.nytimes.com/2021/01/26/style/instagram-growth-hack.html>

complementors, the indirect effects on other ecosystem actors can vary dramatically. Complicating matters even further, the effects and implications of services offered by SOE actors for the platform and the other ecosystem actors are dynamic and may shift over time as SOE actors' service and the platform ecosystem itself evolve (Rietveld et al., 2020).

Indirect effects on the platform firms

As an intermediary, the platform firm's success is predicated upon the value created by the complementors (Jacobides et al., 2018; McIntyre & Srinivasan, 2017). It is their offerings that attract the users, driving both the platform's scalability and profitability (Cennamo & Santalo, 2019; Gawer, 2021a). This intermediate position of the platform firm means that it can be affected in multiple ways by the offerings SOE actors provide to complementors. By strengthening and improving complementors' capabilities, some SOE actors may indirectly strengthen the scale and profitability of the platform firm. For example, when SOE actors help professionalize the complementors and improve the value that they create (Sigala, 2018), they ultimately improve the platform's offerings.

Other SOE actors can broker (recognize, adapt, and disseminate) best practices across complementors for both general business practices as well as effective interactions with the platform firm. As an example, a study by Bishop (2020) of two well-known YouTube advisors found that their efforts reinforced the advice that YouTube itself provided. In this way, they supported the platform by encouraging conformity to platform-desired behaviors (Ceccagnoli et al., 2012; Tiwana et al., 2010; Wareham et al., 2014). SOE services can also benefit the platform and enhance its innovative potential, as it is the innovation by complementors that lead Cusumano et al. (2019) to term certain platforms "innovation platforms." In addition to enabling complementors' innovations with dedicated services, SOEs form a dynamic locus of innovation,

as these actors can also develop and demonstrate new capabilities and/or offerings that the platform can incorporate, effectively extending the functionalities of the platform.

SOE actors can reduce barriers to entry for complementors joining a platform, whether through education, consulting, or specific products or services that reduce the uncertainty, time, and expense of establishing a platform-based business. In addition, they can interfere with platforms' boundary decisions by influencing the composition of the sides constituting the ecosystem (Gawer, 2021b). To illustrate, the formalization of property-management services for Airbnb eased the entrance of real estate investors that purchased properties with the goal of converting them to short-term Airbnb rentals. For Airbnb, the emergence of these larger-scale property owners was positive, as it increased the appeal of the platform to a wider multi-segment audience (Cocola-Gant & Gago, 2021). These illustrative examples reflect positive indirect effects on the platform firm, whose success is predicated upon ensuring that their complementors continue to create value—of which they capture some share (Cennamo & Santalo, 2019; Gawer, 2021a; Kapoor & Agarwal, 2018).

However, as discussed in the previous section, in cases where some SOE services strengthened the position of the complementors vis-à-vis the platform, this ipso facto weakens the power of the platform firm. The key to platform-managed ecosystems is the structure that ensures control over the complementor's activities (Altman et al., 2021; Cutolo & Kenney, 2021). Under certain conditions, the services offered within SOEs may undermine this control, thereby reducing a platform's capability to capture more of the value generated or even retain its complementors.⁸ More directly, SOE actors may assist complementors in evading the platform's rules and game the platform firm's algorithms to appear in more searches, reduce payments, or inflate user reviews. This may result in a degradation of trust in the platform ecosystem by other sides and may

⁸ For example, the power of the YouTube influencer results from the "stage" that YouTube gives them, but if they generate off-platform income, YouTube does not capture any of that revenue stream.

undermine the platform's control over the quality and curation of the ecosystems' offerings (He et al., 2021).

In a more fundamental challenge, SOE actors can enable complementors to disintermediate the platform firms by creating channels for direct communication between complementors and other sides of the platforms (Gu & Zhu, 2020; Ladd, 2021), eroding the platform's control of the connection nexus. For instance, the Famebit business model was a service that let brands seeking product placements or partnership deals connect directly with YouTubers—effectively disintermediating YouTube.

The remarkable diversity of SOE actors results in them having an equally remarkable variety of impacts on the platform itself. As we have shown, some of their services encourage complementors to conform to the platform's requirements and thus reinforce the platform's power and efficiency—one could argue that they make the complementors more dependent even though it increases their profits. Other SOE actors provide services that can, in part, redress the power asymmetries that the complementors experience in relation to the platform. Moreover, for the platforms, SOEs can have contradictory impacts over time. Returning to the FameBit example, it had an initial positive effect in that it provided more income to the YouTubers it served, who could barely survive on the meager ad income. In this respect, FameBit incentivized them to create more videos. However, as FameBit grew, the YouTubers discovered that influencer marketing could generate significant income outside the platform's control. For YouTube, this threatened its entire advertising business model. In this case, the SOE service evolved from a useful adjunct to a threat that required a response: In 2016, YouTube acquired FameBit and later renamed it BrandConnect.

Indirect effects on the alternative side(s)

SOE services for one side of the platform can impact other platform sides (e.g., users, viewers, advertisers, delivery partners, etc.). SOE actors may offer solutions that optimize product offerings (i.e., introducing better search terms, better features, better targeting), marketing, and fulfillment in ways that improve their overall ease of use and the experiences of platform users. They can also have positive impacts on the other side(s) by providing mechanisms for circumventing the platform's intermediary functions (Gu & Zhu, 2020; Zhou et al., 2021). For instance, Podcorn enabled podcasters to build sponsorship arrangements directly with advertisers. Similarly, there are a host of SOE actors that enable hotels to migrate potential guests from travel platforms to their own loyalty plans, direct marketing, reservations, and payment systems (Balsinger et al., 2022). In these cases, the SOE decreases the cost of the transaction or makes it more efficient in some way.

However, SOE services may also have negative effects on the other side's welfare. For example, for YouTube's advertisers, the SOE's provision of fake views means they are paying for valueless views. Similarly, the market for counterfeit reviews may be particularly harmful to users, as it erodes the long-term trust in the review and reputation system, which is crucial for the platform ecosystem to flourish (Einav et al., 2016; He et al., 2021; Tadelis, 2016).

In summary, this section explored the ways in which the business models introduced by SOE actors to assist complementors in creating and capturing value can have impacts on both the platforms and other platform sides. While our discussion has focused on discrete effects, we recognize that the impacts of SOE actors' services can combine and interact in ways that can, in certain cases, even shape the platform ecosystem's evolution and the resulting market structures.

IV. Discussion

Research on online platforms has evolved in recent years, moving its focus from platform owners to the large ecosystem of actors that cluster around a successful online platform and supply complementary products and services (Ceccagnoli et al., 2012; Curchod et al., 2020; Nambisan & Baron, 2021; Zhu & Liu, 2018). This more recent literature highlights that complementors face novel and evolving challenges in building and sustaining a competitive advantage due to the growth and expansion of platform-managed ecosystems (Boudreau, 2012; Cusumano et al., 2019, Kapoor & Agarwal, 2017). Moreover, it recognizes that complementors are increasingly forced to develop strategies that mitigate the power asymmetries and paradoxical tensions that characterize platform-managed ecosystems (Altam et al., 2021; Cutolo et al., 2021; Rietveld et al., 2020; Wang & Miller, 2019). Yet, this emergent stream of research overlooks the conceptual and strategic implications that such a change of perspective suggests—specifically, the emergence of a heterogeneous set of actors within an SOE that help complementors deal with these complex problems.

In this paper we make two main contributions. First, we explore and discuss the intricate set of business activities that develop in the SOEs that organically emerges around the complementors, outside the direct control of the platform firm. Second, we elucidate the strategic impacts that SOEs have on complementors, the platform firm, and the alternative sides. By introducing the SOE as a distinct, emergent, and significant aspect of platforms and related ecosystems, we challenge some of the underlying assumptions of platform theory that adopt what might be termed a *Ptolemaic* model of platform ecosystems centered around the platform firm. Our purpose has been to shift the conceptual emphasis away from the platform firm and

promote a *Copernican* perspective that permits us to rethink the elements that constitute platform ecosystems, the relationships between them, and ultimately the dynamics regulating the evolution of these systems.

Besides recognizing the roles and the effects of SOEs, there are still many more questions to be answered in addition to the ones featured in this paper. Recognizing SOEs will be particularly generative for four important themes of platform research, namely competition within platforms, competition between platforms, platform governance, and also the evolutionary dynamics of platform ecosystems.

Theme 1: Within-platform competition

The growth of platform ecosystems is making the role of complementors increasingly relevant. As such, research is increasingly focused on the competition within platform ecosystems (Cenamor, 2021; Kretschmer et al., 2022). For instance, research has shown that the competitive dynamics within platform ecosystems are increasingly complex due to the variety of different complementors and the speed at which they change (Boudreau, 2012; Cenamor, 2021), the evolving preferences and behavior of users (Panico & Cennamo, 2020; Rietveld & Eggers, 2018), and, perhaps more importantly, the competitive dynamics between platform owners and complementors (Wu & Zhu, 2019; Zhu & Liu, 2018). These advances have only begun to consider the challenges facing complementors as they build their businesses in the complex business environments characterizing platform-organized markets (Cutolo et al., 2021). Moreover, with a limited understanding of the offerings and tools provided by SOEs, researchers and entrepreneurs seeking to understand complementor strategy (Cennamor, 2021; Helfat & Raubitschek, 2018) miss out on the important aspect of complementor agency. If we recognize that complementors' competitive dynamics are conditioned by the activities and services provided by the SOEs' actors,

we can develop more comprehensive and realistic analysis and practitioner advice on the capabilities needed to create and capture value in platform-managed ecosystems. To illustrate, the strategies and affordances provided by SOE actors will be important variables for understanding some of the most fundamental strategic decisions for complementors, such as multi-homing and product placement. Recent empirical work found that for optimal performance “complementors should increase their investments and efforts within a specific product category and expand its scale across various platform ecosystems ... or they should increase their investments and efforts within a single platform ecosystem while achieving scope benefits across various product categories in that platform ecosystem” (Tavalei & Cennamo, 2021, p. 2). However, as many of our examples illustrate, complementors can benefit greatly from leveraging the resources provided by SOEs to overcome the complexities and specialization trade-offs that moving across and within platform ecosystems imply for them. Future research could investigate how the interaction between SOEs and complementors alters the combinations of scale and scope choices that could ensure optimal decision-making.

Theme 2: Inter-platform competition

Inter-platform competition is one of the most developed areas of platform ecosystem research (Cennamo & Santaló, 2019; Eisenmann et al., 2011; Hagiu & Wright, 2015; Rietveld & Schilling, 2021; Rochet & Tirole, 2003). SOE actors influence the competitiveness of platforms in ways that have not attracted sufficient attention, therefore there is a considerable opportunity for research. For instance, one productive area for further investigation is the impact of SOEs on the factors shaping if and when dominant platforms get displaced. SOE actors can facilitate growth and improve the performance of the population of complementors as their services add value to complementors’ offerings and ease their operations on the platforms. In this way, an SOE may

increase the dominance of incumbent platforms versus new entrants by influencing defensibility drivers such as the network effect and offering quality (Zhu & Iansiti, 2012). SOEs thus can contribute to incumbents' competitive advantage over rivals, even as, in other cases, they can assist new entrants in displacing a dominant platform by reducing complementors' dependence (Cennamo & Santalo, 2013; Cennamo et al., 2018). SOE actors in fact can support complementors on a dominant platform to also participate, for relatively incremental cost, on other platforms (Tavalei & Cennamo, 2021). For example, SOEs may create applications for creative content sharing on multiple streaming platforms (e.g., posting short-form videos across Instagram, Snapchat, and TikTok) or posting rentals on Airbnb and VRBO. This will affect the value proposition of the incumbent platform's offerings (Crane, 2019) and increase the willingness of customers to search more broadly and, consequently, reduce costs of user acquisition for emerging platforms.

Theme 3: Platform governance and coordination strategies

Platform governance and coordination strategies are one of the most important areas of focus in platform research (Altaman et al., 2021; Chen et al., 2022b; Rietveld & Schilling, 2021). The key efforts platform owners undertake are ensuring that ecosystem members' actions are aligned with the ecosystem logic (Boudreau & Hagiu, 2009; Iansiti & Levien, 2004; Wareham et al., 2014). This includes the design of boundary resources so that they maximize engagement and generativity while constraining low-quality outputs (Cennamo & Santalo, 2019; Ghazawneh & Henfridsson, 2013; Tiwana et al., 2010). Prior research approached these tensions mostly by conceptualizing platforms as controlled and managed environments (Altman et al., 2022), where platforms set rules for user participation and engagement on both sides of the market (Tiwana et al., 2010, Wareham et al., 2014). Future studies might examine the implications of extending the boundaries of the

existing governance frameworks to consider SOEs and their evolving impacts on the ecosystems' members. This would offer an opportunity to advance a more holistic and dynamic perspective on platform governance research, one that captures the evolvability of the platform-managed ecosystem (Kyprianou, 2018; Rietveld et al., 2020; Tiwana et al., 2010; Wareham et al., 2014).

In this respect, platform-governance mechanisms need to embrace the changing nature of ecosystems and define how ongoing decisions are made about the activities of SOEs. When and under what conditions should platforms encourage, emulate, or prohibit the activities of SOE actors? For instance, several studies have highlighted the importance of certification as an important and effective governance mechanism (e.g., Aguiar & Waldfogel, 2021; Elfenbein et al., 2015; Rietveld et al., 2021). Already many business software platform firms certify preferred SOEs and use these programs to structure their roles and manage the overall ecosystem. Further explicating conditions under which platform firms should engage in the selective promotion of SOE actors and their services is another rich area for future work.

Theme 4: Evolutionary dynamics of platforms

Research on how platforms and related ecosystems evolve is still immature (de Reuver et al., 2018; Gawer, 2021b; Rietveld & Schilling, 2021), particularly from a perspective that considers how the ecosystem structure changes in response to the diverse activities and contributions of ecosystem participants (Staub et al., 2021). In this respect, future research could investigate the co-evolutionary processes through which the technology and/or functionalities of a digital platform and the innovative potential distributed across SOE actors mutually influence each other. This perspective offers (at least) two fruitful sub-areas of research.

First, we invite researchers to better understand platform firms' motives for, modes of, and consequences of vertically integrating (or not) into the SOE space. Previous research shows how

platforms may choose to expand scope through acquisitions (Gawer, 2021b). In serving complementors, SOEs identify and develop novel interactions and features that the platform firm may recognize as valuable innovations and attempt to block, replicate, acquire, or pursue partnerships with the SOE actor—any of which could alter the ecosystem’s evolutionary trajectory. For example, YouTube acquired FameBit and rebranded it as YouTube BrandConnect; replicated the services of SOE actors providing merchandise to create YouTube Merch; and partnered with SocialBlade to offer creators another resource for viewing information about other channels and seeing analytics about their own channel. In further developing insights on platform expansion, it will also be helpful to look into why platform firms might pursue any of these strategies, how these motivations change during different phases of a platform’s and, of course, the SOE actor’s life cycle. More generally, do different SOE actor strategies have different impacts upon ecosystem evolution?

Second, following the observation that the SOE impacts on the platform and its ecosystem are determined by the specific service provided and, very importantly, the evolutionary potential of the platform’s business model, future research will benefit from studying how these impacts evolve. SOE presence in the early stage of a platform lifecycle may help the platform in winning the race for network effects that leads to a market tipping point. That’s because as we discussed, SOEs can provide incentives for new complementors to join the platform and improve their competitive performance, thereby growing network effects across the sides. Conversely, as platforms mature, the capabilities of SOE actors, while benefiting the complementors, may begin to compete or conflict with the platform firm’s attempts to prioritize its own profit-seeking strategies (Gawer, 2021a; Rietveld et al., 2020). In this case, what initially appeared to be a peripheral and innocuous ancillary activity may evolve to even threaten the platform's competitive

position. Accounting for the temporal nature of these dynamics could help develop a richer understanding of how platforms' evolutionary trajectory is influenced by SOEs during the platform life cycle.

V. Conclusion

Research on the dynamics of platforms and their ecosystems has made remarkable progress. However, the significant economic and strategic activity taking place in the second-order ecosystems of platforms that serve complementors has been largely overlooked. This is not surprising, as the traditional model of platforms has relegated the SOE and their activities to background noise within the managed ecosystem (Altman et al., 2022). We show how recognizing the SOE and its impacts would yield a more comprehensive yet nuanced understanding of the competitive and strategic dynamics in platform-managed ecosystems.

The characteristics of the SOE are quite different from that of the managed ecosystem, which is highly constrained by the boundary resources provided and terms and conditions mandated by the platform. The SOE represents a diversity of actors that serve the complementors of a platform and reflect the diversity of their needs — needs that are emergent, often specific to the particular platform, and discovered or created through entrepreneurial efforts. The largest SOEs are exceptionally dynamic, with services proliferating for several reasons. First, platform ecosystems represent new markets spawning new firms, whose needs and opportunities continue to emerge and evolve. Second, while many services are physical and thus bounded, the entire platform consists of software and data, and many of the services are the product of what Jonathan Zittrain (2008) terms the “generativity” of the digital. An example of this is the reservation software that allows hosts to list their properties on Airbnb and VRBO simultaneously. In this case, the software uses the boundary resources of both platforms to create a new and valuable product simplifying

multi-homing. Finally, less constrained by the restrictions of the platform firm, SOEs represent arenas for experimentation and diffusion where both challenges to and opportunities for the platform's evolution are most likely to emerge.

In this paper, we have illuminated a neglected but important set of actors in the platform economy (Kenney & Zysman, 2016). These actors—platform firms and complementors—understand the importance of monitoring innovations in the SOE. Many of the new services added to platforms are responses to and the absorption of innovations introduced by SOE actors. For example, Airbnb acquired various property management services (e.g., Luckey Homes, Proprly) to provide a more complete package to its complementors and presumably bind them more closely to the platform. For policy-makers, understanding and even encouraging the growth of the SOE could assist in curbing platform power. For those seeking to understand platform-complementor relationships, considering the impact of the SOE would seem to offer an opportunity to enrich our understanding of platform dynamics. We hope our framework will inform and inspire future strategy and platform-based entrepreneurship research.

References

- Adner, R. (2017). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal of Management*, 43(1), 39–58. <https://doi.org/10.1177/0149206316678451>
- Aguiar, L., & Waldfogel, J. (2021). Platforms, Power, and Promotion: Evidence from Spotify Playlists. *The Journal of Industrial Economics*, 69(3), 653–691. <https://doi.org/10.1111/joie.12263>
- Altman, E. J., Nagle, F., & Tushman, M. L. (2022). The Translucent Hand of Managed Ecosystems: Engaging Communities for Value Creation and Capture. *Academy of Management Annals*, 16(1), 70–101. <https://doi.org/10.5465/annals.2020.0244>
- Anderson, E. G., Parker, G. G., & Tan, B. (2014). Platform Performance Investment in the Presence of Network Externalities. *Information Systems Research*, 25(1), 152–172. <https://doi.org/10.1287/isre.2013.0505>
- Baldwin, C. Y., & Clark, K. B. (2000). *Design Rules: The Power of Modularity*. The MIT Press. <https://doi.org/10.7551/mitpress/2366.001.0001>
- Baldwin, C. Y., & Woodard, C. J. (2009). The Architecture of Platforms: A Unified View. In A. Gawer, *Platforms, Markets and Innovation* (p. 13257). Edward Elgar Publishing. <https://doi.org/10.4337/9781849803311.00008>
- Balsiger, P., Jammet, T., Cianferoni, N., & Surdez, M. (2022). Coping with digital market re-organization: How the hotel industry strategically responds to digital platform power. *Competition & Change*, 102452942110556. <https://doi.org/10.1177/10245294211055612>
- Bishop, S. (2020). Algorithmic Experts: Selling Algorithmic Lore on YouTube. *Social Media + Society*, 6(1), 205630511989732. <https://doi.org/10.1177/2056305119897323>
- Bogers, M., Sims, J., & West, J. (2019). What Is an Ecosystem? Incorporating 25 Years of Ecosystem Research. *Academy of Management Proceedings*, 2019(1), 11080. <https://doi.org/10.5465/AMBPP.2019.11080abstract>
- Boudreau, K. J. (2012). Let a Thousand Flowers Bloom? An Early Look at Large Numbers of Software App Developers and Patterns of Innovation. *Organization Science*, 23(5), 1409–1427. <https://doi.org/10.1287/orsc.1110.0678>
- Boudreau, K. J., & Hagiu, A. (2009). Platform Rules: Multi-Sided Platforms as Regulators. In A. Gawer, *Platforms, Markets and Innovation* (p. 13257). Edward Elgar Publishing. <https://doi.org/10.4337/9781849803311.00014>
- Burgess, J., & Green, J. (2018). *Youtube: Online video and participatory culture* (Second edition). Polity Press.
- Caplan, R., & Gillespie, T. (2020). Tiered Governance and Demonetization: The Shifting Terms of Labor and Compensation in the Platform Economy. *Social Media + Society*, 6(2), 205630512093663. <https://doi.org/10.1177/2056305120936636>
- Ceccagnoli, M., Forman, C., Huang, P., & Wu, D. J. (2012). Cocreation of Value in a Platform Ecosystem! The Case of Enterprise Software. *MIS Quarterly*, 36(1), 263. <https://doi.org/10.2307/41410417>
- Cenamora, J. (2021). Complementor competitive advantage: A framework for strategic decisions. *Journal of Business Research*, 122, 335–343. <https://doi.org/10.1016/j.jbusres.2020.09.016>

- Cennamo, C., Ozalp, H., & Kretschmer, T. (2018). Platform Architecture and Quality Trade-offs of Multihoming Complements. *Information Systems Research*, 29(2), 461–478. <https://doi.org/10.1287/isre.2018.0779>
- Cennamo, C., & Santalo, J. (2013). Platform competition: Strategic trade-offs in platform markets: Platform Competition. *Strategic Management Journal*, 34(11), 1331–1350. <https://doi.org/10.1002/smj.2066>
- Cennamo, C., & Santaló, J. (2019). Generativity Tension and Value Creation in Platform Ecosystems. *Organization Science*, 30(3), 617–641. <https://doi.org/10.1287/orsc.2018.1270>
- Chen, L., Tong, T. W., Tang, S., & Han, N. (2022a). Governance and Design of Digital Platforms: A Review and Future Research Directions on a Meta-Organization. *Journal of Management*, 48(1), 147-184.
- Chen, L., Yi, J., Li, S., & Tong, T. W. (2022b). Platform Governance Design in Platform Ecosystems: Implications for Complementors' Multihoming Decision. *Journal of Management*, 48(3), 630–656. <https://doi.org/10.1177/0149206320988337>
- Clough, D. R., & Wu, A. (2022). Artificial Intelligence, Data-Driven Learning, and the Decentralized Structure of Platform Ecosystems. *Academy of Management Review*, 47(1), 184–189. <https://doi.org/10.5465/amr.2020.0222>
- Cocola-Gant, A., Hof, A., Smigiel, C., & Yrigoy, I. (2021). Short-term rentals as a new urban frontier – evidence from European cities. *Environment and Planning A: Economy and Space*, 53(7), 1601–1608. <https://doi.org/10.1177/0308518X211042634>
- Curchod, C., Patriotta, G., Cohen, L., & Neysen, N. (2020). Working for an Algorithm: Power Asymmetries and Agency in Online Work Settings. *Administrative Science Quarterly*, 65(3), 644–676. <https://doi.org/10.1177/0001839219867024>
- Cusumano, M. A., Gawer, A., & Yoffie, D. B. (2019). *The business of platforms: Strategy in the age of digital competition, innovation, and power* (First edition). Harper Business, an imprint of HarperCollinsPublishers.
- Cutolo, D., Hargadon, A., & Kenney, M. (2021). Competing on platforms. *MIT Sloan Management Review*, 62(3), 22–30.
- Cutolo, D., & Kenney, M. (2021). Platform-Dependent Entrepreneurs: Power Asymmetries, Risks, and Strategies in the Platform Economy. *Academy of Management Perspectives*, 35(4), 584–605. <https://doi.org/10.5465/amp.2019.0103>
- Drott, E. (2020). Fake Streams, Listening Bots, and Click Farms: Counterfeiting Attention in the Streaming Music Economy. *American Music*, 38(2), 153–175. <https://doi.org/10.5406/americanmusic.38.2.0153>
- Dushnitsky, G., & Stroube, B. K. (2021). Low-code entrepreneurship: Shopify and the alternative path to growth. *Journal of Business Venturing Insights*, 16, e00251. <https://doi.org/10.1016/j.jbvi.2021.e00251>
- Eaton, B., Elaluf-Calderwood, S., Sørensen, C., & Yoo, Y. (2015). Distributed Tuning of Boundary Resources: The Case of Apple's iOS Service System. *MIS Quarterly*, 39(1), 217–243. <https://doi.org/10.25300/MISQ/2015/39.1.10>
- Einav, L., Farronato, C., & Levin, J. (2016). Peer-to-Peer Markets. *Annual Review of Economics*, 8(1), 615–635. <https://doi.org/10.1146/annurev-economics-080315-015334>
- Eisenmann, T., Parker, G., & Van Alstyne, M. (2011). Platform envelopment. *Strategic Management Journal*, 32(12), 1270–1285. <https://doi.org/10.1002/smj.935>

- Elfenbein, D. W., Fisman, R., & McManus, B. (2015). Market Structure, Reputation, and the Value of Quality Certification. *American Economic Journal: Microeconomics*, 7(4), 83–108. <https://doi.org/10.1257/mic.20130182>
- Evans, D. S. (2003). Some Empirical Aspects of Multi-sided Platform Industries. *Review of Network Economics*, 2(3). <https://doi.org/10.2202/1446-9022.1026>
- Evans, D. S., & Schmalensee, R. (2016). *Matchmakers: The new economics of multisided platforms*. Harvard Business Review Press.
- Foerderer, J., Kude, T., Schuetz, S. W., & Heinzl, A. (2019). Knowledge boundaries in enterprise software platform development: Antecedents and consequences for platform governance. *Information Systems Journal*, 29(1), 119–144. <https://doi.org/10.1111/isj.12186>
- Gardner, J., & Lehnert, K. (2016). What's new about new media? How multi-channel networks work with content creators. *Business Horizons*, 59(3), 293–302. <https://doi.org/10.1016/j.bushor.2016.01.009>
- Gawer, A. (2014). Bridging differing perspectives on technological platforms: Toward an integrative framework. *Research Policy*, 43(7), 1239–1249. <https://doi.org/10.1016/j.respol.2014.03.006>
- Gawer, A. (2021a). Digital platforms and ecosystems: Remarks on the dominant organizational forms of the digital age. *Innovation*, 1–15. <https://doi.org/10.1080/14479338.2021.1965888>
- Gawer, A. (2021b). Digital platforms' boundaries: The interplay of firm scope, platform sides, and digital interfaces. *Long Range Planning*, 54(5), 102045. <https://doi.org/10.1016/j.lrp.2020.102045>
- Gawer, A., & Cusumano, M. A. (2002). *Platform leadership: How Intel, Microsoft, and Cisco drive industry innovation*. Harvard Business School Press.
- Gawer, A., & Cusumano, M. A. (2014). Industry Platforms and Ecosystem Innovation: Platforms and Innovation. *Journal of Product Innovation Management*, 31(3), 417–433. <https://doi.org/10.1111/jpim.12105>
- Gawer, A., & Henderson, R. (2007). Platform Owner Entry and Innovation in Complementary Markets: Evidence from Intel. *Journal of Economics & Management Strategy*, 16(1). <https://doi.org/10.1111/j.1530-9134.2007.00130.x>
- Ghazawneh, A., & Henfridsson, O. (2013). Balancing platform control and external contribution in third-party development: The boundary resources model: Control and contribution in third-party development. *Information Systems Journal*, 23(2), 173–192. <https://doi.org/10.1111/j.1365-2575.2012.00406.x>
- Gregory, R. W., Henfridsson, O., Kaganer, E., & Kyriakou, H. (2022). Data Network Effects: Key Conditions, Shared Data, and the Data Value Duality. *Academy of Management Review*, 47(1), 189–192. <https://doi.org/10.5465/amr.2021.0111>
- Gu, G., & Zhu, F. (2021). Trust and Disintermediation: Evidence from an Online Freelance Marketplace. *Management Science*, 67(2), 794–807. <https://doi.org/10.1287/mnsc.2020.3583>
- Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic Management Journal*, 33(6), 571–586. <https://doi.org/10.1002/smj.1975>
- Hagiu, A., & Wright, J. (2015). Multi-sided platforms. *International Journal of Industrial Organization*, 43, 162–174. <https://doi.org/10.1016/j.ijindorg.2015.03.003>

- Hagi, A., & Wright, J. (2021). Don't Let Platforms Commoditize Your Business. *Harvard Business Review*, 99(3), 108–114.
- Hänninen, M., & Smedlund, A. (2021). Same Old Song with a Different Melody: The Paradox of Market Reach and Financial Performance on Digital Platforms. *Journal of Management Studies*, 58(7), 1832–1868. <https://doi.org/10.1111/joms.12701>
- He, S., Hollenbeck, B., & Proserpio, D. (2022). The Market for Fake Reviews. *Marketing Science*, mksc.2022.1353. <https://doi.org/10.1287/mksc.2022.1353>
- Hein, A., Weking, J., Schrieck, M., Wiesche, M., Böhm, M., & Krcmar, H. (2019). Value co-creation practices in business-to-business platform ecosystems. *Electronic Markets*, 29(3), 503–518. <https://doi.org/10.1007/s12525-019-00337-y>
- Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems. *Research Policy*, 47(8), 1391–1399. <https://doi.org/10.1016/j.respol.2018.01.019>
- Hou, H., & Shi, Y. (2021). Ecosystem-as-structure and ecosystem-as-coevolution: A constructive examination. *Technovation*, 100, 102193. <https://doi.org/10.1016/j.technovation.2020.102193>
- Hunt, K. (2015). Gaming the system: Fake online reviews v. consumer law. *Computer Law & Security Review*, 31(1), 3–25. <https://doi.org/10.1016/j.clsr.2014.11.003>
- Iansiti, M., & Levien, R. (2004). Strategy as ecology. *Harv Bus Rev*, 82(3), 68–78, 126. PubMed.
- Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, 39(8), 2255–2276. <https://doi.org/10.1002/smj.2904>
- Jacobides, M. G., & Lianos, I. (2021). Ecosystems and competition law in theory and practice. *Industrial and Corporate Change*, 30(5), 1199–1229. <https://doi.org/10.1093/icc/dtab061>
- Johnson, J., Rhodes, A., & Wildenbeest, M. R. (2020). Platform design when sellers use pricing algorithms. Available at SSRN 3753903.
- Kapoor, R., & Agarwal, S. (2017). Sustaining superior performance in business ecosystems: Evidence from application software developers in the iOS and Android smartphone ecosystems. *Organization Science*, 28(3), 531–551. <https://doi.org/10.1287/orsc.2017.1122>
- Kenney, M., & Zysman, J. (2016). The rise of the platform economy. *Issues in Science and Technology*, 32(3), 61.
- Knight, F. H. (1921). Cost of production and price over long and short periods. *Journal of Political Economy*, 29(4), 304–335.
- Kretschmer, T., Leiponen, A., Schilling, M., & Vasudeva, G. (2022). Platform ecosystems as meta-organizations: Implications for platform strategies. *Strategic Management Journal*, 43(3), 405–424. <https://doi.org/10.1002/smj.3250>
- Kyprianou, C. (2018). Creating value from the outside in or the inside out: How nascent intermediaries build peer-to-peer marketplaces. *Academy of Management Discoveries*, 4(3), 336–370. <https://doi.org/10.5465/amd.2017.0081>
- Ladd, T. (2021). The Achilles' heel of the platform business model: Disintermediation. *Business Horizons*, S0007681321000689. <https://doi.org/10.1016/j.bushor.2021.02.049>
- MacCorquodale, K., & Meehl, P. E. (1948). On a distinction between hypothetical constructs and intervening variables. *Psychological Review*, 55(2), 95–107. <https://doi.org/10.1037/h0056029>

- McIntyre, D. P., & Srinivasan, A. (2017). Networks, platforms, and strategy: Emerging views and next steps. *Strategic Management Journal*, 38(1), 141–160. <https://doi.org/10.1002/smj.2596>
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review*, 31(1), 132–152. <https://doi.org/10.5465/amr.2006.19379628>
- Nambisan, S., & Baron, R. A. (2021). On the costs of digital entrepreneurship: Role conflict, stress, and venture performance in digital platform-based ecosystems. *Journal of Business Research*, 125, 520–532. <https://doi.org/10.1016/j.jbusres.2019.06.037>
- Nguyen, G. (2021, August). How Google and Yelp handle fake reviews and policy violations. *Search Engine Land*. <https://searchengineland.com/how-google-and-yelp-handle-fake-reviews-and-policy-violations-374071>
- Ozalp, H., Cennamo, C., & Gawer, A. (2018). Disruption in platform-based ecosystems. *Journal of Management Studies*, 55(7), 1203–1241. <https://doi.org/10.1111/joms.12351>
- Panico, C., & Cennamo, C. (2022). User preferences and strategic interactions in platform ecosystems. *Strategic Management Journal*, 43(3), 507–529.
- Petre, C., Duffy, B. E., & Hund, E. (2019). “Gaming the System”: Platform Paternalism and the Politics of Algorithmic Visibility. *Social Media + Society*, 5(4), 205630511987999. <https://doi.org/10.1177/2056305119879995>
- Rietveld, J., & Eggers, J. P. (2018). Demand Heterogeneity in Platform Markets: Implications for Complementors. *Organization Science*, 29(2), 304–322. <https://doi.org/10.1287/orsc.2017.1183>
- Rietveld, J., Ploog, J. N., & Nieborg, D. B. (2020). Coevolution of Platform Dominance and Governance Strategies: Effects on Complementor Performance Outcomes. *Academy of Management Discoveries*, 6(3). <https://doi.org/10.5465/amd.2019.0064>
- Rietveld, J., & Schilling, M. A. (2021). Platform Competition: A Systematic and Interdisciplinary Review of the Literature. *Journal of Management*, 47(6), 1528–1563. <https://doi.org/10.1177/0149206320969791>
- Rietveld, J., Seamans, R., & Meggiorin, K. (2021). Market Orchestrators: The Effects of Certification on Platforms and Their Complementors. *Strategy Science*, 6(3), 244–264. <https://doi.org/10.1287/stsc.2021.0135>
- Rochet, J.-C., & Tirole, J. (2003). Platform Competition in Two-Sided Markets. *Journal of the European Economic Association*, 1(4), 990–1029. <https://doi.org/10.1162/154247603322493212>
- Sanchez, R., & Mahoney, J. T. (1996). Modularity, flexibility, and knowledge management in product and organization design: Modularity, Flexibility, and Knowledge Management. *Strategic Management Journal*, 17(S2), 63–76. <https://doi.org/10.1002/smj.4250171107>
- Shane, S., & Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. *The Academy of Management Review*, 25(1), 217. <https://doi.org/10.2307/259271>
- Sigala, M. (2018). Market Formation in the Sharing Economy: Findings and Implications from the Sub-economies of Airbnb. In S. Barile, M. Pellicano, & F. Polese (Eds.), *Social Dynamics in a Systems Perspective* (pp. 159–174). Springer International Publishing. https://doi.org/10.1007/978-3-319-61967-5_9

- Stark, D., & Pais, I. (2021). Algorithmic Management in the Platform Economy. *Sociologica*, 47-72 Pages. <https://doi.org/10.6092/ISSN.1971-8853/12221>
- Staub, N., Haki, K., Aier, S., Winter, R., & Magan, A. (2021). Acquisition of Complementors as a Strategy for Evolving Digital Platform Ecosystems. *MIS Quarterly Executive*, 20(4), 237–258.
- Suddaby, R. (Ed.). (2010). Editor's Comments: Construct Clarity in Theories of Management and Organization. *Academy of Management Review*, 35(3), 346–357. <https://doi.org/10.5465/amr.35.3.zok346>
- Sutton, R. I., & Staw, B. M. (1995). What Theory is Not. *Administrative Science Quarterly*, 40(3), 371. <https://doi.org/10.2307/2393788>
- Tadelis, S. (2016). Reputation and Feedback Systems in Online Platform Markets. *Annual Review of Economics*, 8(1), 321–340. <https://doi.org/10.1146/annurev-economics-080315-015325>
- Tavalaei, M. M., & Cennamo, C. (2021). In search of complementarities within and across platform ecosystems: Complementors' relative standing and performance in mobile apps ecosystems. *Long Range Planning*, 54(5), 101994. <https://doi.org/10.1016/j.lrp.2020.101994>
- Thomas, L. D. W., Autio, E., & Gann, D. M. (2014). Architectural Leverage: Putting Platforms in Context. *Academy of Management Perspectives*, 28(2), 198–219. <https://doi.org/10.5465/amp.2011.0105>
- Tiwana, A. (2014). *Platform ecosystems: Aligning architecture, governance, and strategy*. MK.
- Tiwana, A., Konsynski, B., & Bush, A. A. (2010). Research Commentary—Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics. *Information Systems Research*, 21(4), 675–687. <https://doi.org/10.1287/isre.1100.0323>
- Walker, H. A., & Cohen, B. P. (1985). Scope Statements: Imperatives for Evaluating Theory. *American Sociological Review*, 50(3), 288. <https://doi.org/10.2307/2095540>
- Wang, R. D., & Miller, C. D. (2020). Complementors' engagement in an ecosystem: A study of publishers' e-book offerings on Amazon Kindle. *Strategic Management Journal*, 41(1), 3–26. <https://doi.org/10.1002/smj.3076>
- Wareham, J., Fox, P. B., & Cano Giner, J. L. (2014). Technology Ecosystem Governance. *Organization Science*, 25(4), 1195–1215. <https://doi.org/10.1287/orsc.2014.0895>
- Wen, W., & Zhu, F. (2019). Threat of platform-owner entry and complementor responses: Evidence from the mobile app market. *Strategic Management Journal*, 40(9), 1336–1367. <https://doi.org/10.1002/smj.3031>
- Wu, Y., Ngai, E. W. T., Wu, P., & Wu, C. (2020). Fake online reviews: Literature review, synthesis, and directions for future research. *Decision Support Systems*, 132, 113280. <https://doi.org/10.1016/j.dss.2020.113280>
- Zhang, D., Zhou, L., Kehoe, J. L., & Kilic, I. Y. (2016). What Online Reviewer Behaviors Really Matter? Effects of Verbal and Nonverbal Behaviors on Detection of Fake Online Reviews. *Journal of Management Information Systems*, 33(2), 456–481. <https://doi.org/10.1080/07421222.2016.1205907>
- Zhang, Y., Li, J., & Tong, T. W. (2022). Platform governance matters: How platform gatekeeping affects knowledge sharing among complementors. *Strategic Management Journal*, 43(3), 599–626. <https://doi.org/10.1002/smj.3191>

- Zhou, Q. (Kris), Allen, B. J., Gretz, R. T., & Houston, M. B. (2022). Platform Exploitation: When Service Agents Defect with Customers from Online Service Platforms. *Journal of Marketing*, 86(2), 105–125. <https://doi.org/10.1177/00222429211001311>
- Zhu, F., & Iansiti, M. (2012). Entry into platform-based markets. *Strategic Management Journal*, 33(1), 88–106. <https://doi.org/10.1002/smj.941>
- Zhu, F., & Liu, Q. (2018). Competing with complementors: An empirical look at Amazon.com. *Strategic Management Journal*, 39(10), 2618–2642. <https://doi.org/10.1002/smj.2932>
- Zittrain, J. (2008). *The Future of the Internet--and How to Stop It*. New Haven: Yale University Press.

Figures

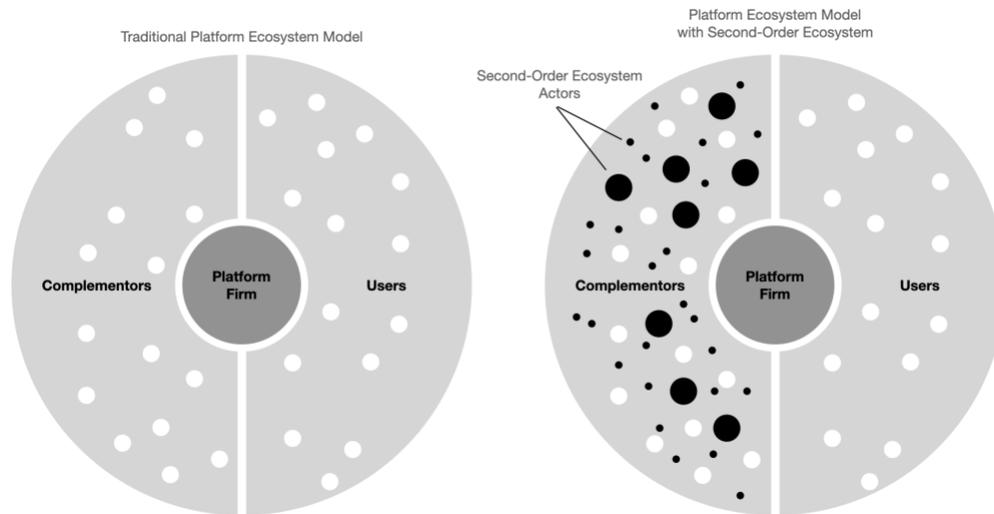


Fig. 1. Traditional Platform Ecosystem Model (left) and an enriched model recognizing the Second-Order Ecosystem (right).