Karhu, Kimmo; Ritala, Paavo

**Slicing the cake without baking it**

*Published in:*
Long Range Planning

*DOI:*
10.1016/j.lrp.2020.101988

Published: 01/10/2021

*Document Version*
Publisher's PDF, also known as Version of record

*Published under the following license:*
CC BY

*Please cite the original version:*
Slicing the cake without baking it: Opportunistic platform entry strategies in digital markets

Kimmo Karhu a, *, Paavo Ritala b

a Aalto University, Department of Computer Science, P.O.Box 15400, FI-00076, Aalto, Finland
b Lappeenranta University of Technology, School of Business and Management, P.O.Box 20, FI-53851, Lappeenranta, Finland

ARTICLE INFO

Keywords:
Platform competition
Platform strategy
Value creation
Value capture
Digital resources

ABSTRACT

The growth of digital platforms relies on the generative nature of digital resources and platforms’ openness to complementary innovation. These features often generate strong network effects and winner-take-all dynamics that protect incumbents from competition. However, under certain conditions, these same features render incumbent platforms vulnerable to competitive strategic moves via entrant platforms wherein the entrants can capture value and simultaneously avoid upfront investments in value creation. In this study, we identify three such strategies: platform exploitation, platform injection, and platform pacing. These strategies allow the entrant platform to capture value using the incumbent ecosystem’s resources by copying parts of the resources (exploitation), by following the development cycle of key boundary resources (pacing), or by placing itself inside the platform (injection). In this study, we employ an interpretative cross-case synthesis to both theorize these strategies as a new category of opportunistic platform competition and to reveal their distinctive characteristics. Overall, the study demonstrates the potential for unconventional and opportunistic platform competition strategies that extend beyond more traditional ones, such as quality, variety, and network size.

Introduction

Digital platforms have grown as a dominant model to organize markets among users and producers of a variety of products and services (McIntyre and Srinivasan, 2017; Reuver et al., 2017). Digital platforms compete in the market via two logics: “winner take all,” which depends on the size of the platform’s user and complementor base; and distinctiveness, which relies on the quality of the platform architecture as well as the scope of the platform’s offering (Cennamo, 2019). Incumbent platform leaders such as Apple and Google have been able to build competitive platform ecosystems that rely on seemingly endless complementor innovation—including, for instance, app developers and content providers—and their resulting ability to provide highly valuable services to the platforms’ end users. Building such a digital platform involves significant investments in developing platform-specific resources, including the platform’s core and boundary resources. Boundary resources (Ghazawneh and Henfridsson, 2013), such as application programming interfaces (APIs), are needed to provide access for the complementors to innovate on the platform. In a platform business model, instead of producing complements internally, platform owner can thus “outsource” part of the value creation by establishing boundary resources to enable external value creation. Indeed, digital platform-based organizing that effectively “inverts the firm” has been suggested as an optimal organizing form for maximizing growth (Parker et al., 2017). However, we argue that under certain conditions

* Corresponding author.
E-mail addresses: kimmo.karhu@aalto.fi (K. Karhu), ritala@lut.fi (P. Ritala).

https://doi.org/10.1016/j.lrp.2020.101988
Received 15 August 2018; Received in revised form 25 February 2020; Accepted 16 March 2020
Available online 19 March 2020
0024-6301/© 2020 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).
this organizing form can also bring about non-optimal consequences for incumbents as well as open the door to non-traditional entry strategies enacted by new competitors.

Despite its benefits, the openness that platform ecosystems advocate to invite complementor innovation (Eisenmann et al., 2009) poses a strategic challenge to incumbent platforms. The more openly and widely the platform resources are made available to third parties, the more vulnerable the incumbent platform becomes to new entrants’ exploitation of those resources. It is already recognized in the literature that platform leaders face a “generativity tension” in which the increasing amount of complementor innovation might reduce the quality of the complements (Cennamo and Santalo, 2019; Ghazawneh and Henfridsson, 2013). We argue that a new type of tension arises due to the same reasons—that is, platform openness to external actors—but from a different source: the platform entrants that seek to exploit the incumbent’s platform resources to facilitate their own platform markets. As noted by Yoo et al. (2012, p. 1400), “organizations must be designed to manage the delicate balance of generativity and control in the platform.” To induce generativity, platform owners are pressed to expose their platforms to complementary innovation. However, in so doing, platforms such as Google Android have also exposed themselves to “platform forking” wherein competing platforms (e.g., Amazon Fire) can exploit both core and complementary resources to establish their own rival offerings (cf. Karhu et al., 2018). Another instance of opportunistic exploitation pursuits is when Google exploited Java’s API for its Android platform, thereby triggering a $9 billion legal case between Oracle and Google (Menell, 2016). These and other recent examples demonstrate that it is often possible for entrant platforms to leapfrog into digital platform markets and largely bypass upfront investment in value creation—in other words, “slicing the cake without baking it.”

While the platform strategy literature has recently witnessed rapid growth, opportunistic and exploitative platform competition dynamics such as those discussed above have thus far been systematically recognized (for recent syntheses, see Cennamo, 2019; McIntyre and Srinivasan, 2017). Rather, the literature predominantly focuses on how platforms attract users and complementors by orchestrating same- and cross-side network effects (Schilling, 2002) and competing for quality, cost, and differentiation (see e.g., Cennamo and Santalo, 2013). Platform strategy scholars who focus on entry strategies have also tracked these themes by concentrating on an entrant platform’s quality, ability to generate indirect network effects, and entry timing (e.g., McIntyre and Subramaniam, 2009; Tellis et al., 2009; Zhu and Iansiti, 2012). The few instances in which the literature discusses how entrants can “leapfrog” incumbent advantage refer to strategies of radical innovation or platform envelopment (Eisenmann et al., 2011; Sheremata, 2004). In the latter strategy, by using its own resources, the entrant platform embeds functionality similar to that of an incumbent inside its own existing platform—that is, “enveloping” it and thereby capturing the rival platform’s users and complementors.

However, even in the envelopment strategy the entrant must considerably invest into its own platform to provide similar or more favorable value for its users. This differs from the strategies we focus on in the current study; those that help entrant platforms to leapfrog such investments in the first place and which involve direct exploitation or imitation of an incumbent’s platform resources. The absence of these themes in the platform strategy literature represents a major research gap given their recently increasing real-life prominence. Recent works in the information systems literature (e.g., Eaton et al., 2015; Karhu et al., 2018) recognize these exploitative moves but theorize the consequences primarily from an incumbent perspective. Further, this emerging literature neither systematically characterizes them as opportunistic strategies for entrant platforms nor distinguishes different strategies from one another.

In the current paper, we address this research gap by identifying an emerging category of platform competition and related entry strategies to digital platform markets. The common characteristic of these strategies is that an external actor who has taken no part in upfront investments in creating value (i.e., “baking the cake”) exploits or imitates an incumbent platform’s resources to compete in the same market for users and/or complements (i.e., “slicing the cake”). By building upon prior studies regarding the specific features of digital resources (Amit and Han, 2017; Yoo et al., 2012, 2010) and digital platforms (Parker et al., 2017; Reuver et al., 2017), we seek to understand why and how incumbent ecosystems remain surprisingly vulnerable to opportunistic strategic moves from outside actors.

More specifically, we set the following research question: What are distinct forms of opportunistic digital platform entry strategies and their boundary conditions? To answer this question, we integrate the understanding of specific features of digital resources and platforms with the mainstream literature on platform competition (Cennamo and Santalo, 2013; Eisenmann et al., 2011). Based on these foundations, we conduct an interpretative multiple-case study (Rauch et al., 2014) and rely on emerging evidence available in case studies that were conducted from various perspectives and in several different fields. We then synthesize the evidence on the new form of opportunistic platform competition and develop a general typology of three entry strategies: (1) platform exploitation, (2) platform injection, and (3) platform pacing. These strategies allow the entrant platform to capture value using the incumbent ecosystem’s resources by copying parts of those resources (exploitation), by following the development cycle of key boundary resources (pacing), or by placing itself inside the platform (injection). Further, we explicate boundary conditions for each approach.

This study contributes to the platform competition literature in three important ways. First, we identify a new platform competition category in addition to the “Schumpeterian” competition alternatives related to quality and differentiation (Cennamo and Santalo, 2013) or platform envelopment that relies on developing similar platform services to an overlapping user base (Eisenmann et al., 2011). The new category we identify is a type of exploitative and opportunistic competition that relies on access, imitation, and/or reliance upon resources that are specific to incumbent platforms but are utilized by an entrant platform in a competitive manner. Second, we identify three opportunistic strategies that entrant platforms can use either individually or in combination to capture value from incumbents’ platform resources. Overall, the existence of these strategic moves countermands the winner-takes-all dynamic (Eisenmann et al., 2006; Schilling, 2002) in that new actors can employ them to capture value from existing platform resources. While it is well known that new platforms can compete by occupying a unique market niche (Gawer and Cusumano, 2008) or by providing superior quality, innovation, or cost advantages (Cennamo and Santalo, 2013; Zhu and Iansiti, 2012), our study suggests that a more
rivalrous approach is also possible under certain conditions. Third, our study provides wider implications for the strategic management literature by demonstrating why incumbents might face difficulty in profiting from innovation in digital platform markets. This is linked to the particular features of platform resources (including the platform’s core and boundary resources) that must be accessible to third parties in order to achieve generativity. Relatedly, we demonstrate how the tension between generativity and control in platform markets (Yoo et al., 2012) appears as a distinct application to the more generic “paradox of openness” faced by innovators who are required to expose their knowledge resources (Laursen and Salter, 2014).

**Conceptual background**

In this section, we briefly conceptualize digital platform ecosystems and competition in digital platform markets. Further, within this context, we discuss the recently witnessed emergence of opportunistic entry strategies. Fig. 1 provides an upfront, stylized version of our conceptual understanding of digital platform ecosystems as well as two types of competition among such ecosystems: traditional platform competition and the opportunistic entry strategies, the latter of which is our article’s focus. The image’s left-hand side details the incumbent’s platform resources (including the platform’s core, boundary resources, and complements) as well as its complementors and users, which together form the platform ecosystem, along with the typical process of value creation within the ecosystem through network effects. Depicted on the image’s right-hand side is an entrant platform that follows the same architectural scheme. In a traditional competition scenario, an entrant would compete with the incumbent by developing its own platform resources and attracting the incumbent’s complementors and users to switch or multihome to its competing platform ecosystem (Fig. 1, top arrow). In an opportunistic approach (Fig. 1, bottom arrow), the entrant instead exploits or imitates core and/or boundary resources from the incumbent platform. This approach allows for a range of benefits, such as avoiding costs of building platform resources or even indirect or direct exploitation of incumbent ecosystem’s users and complementors.

While in the opportunistic competition the two platforms share some platform resources, it is important to understand that there is at a same time a strong competitive stance, since the two platforms offer similar products competing for the same users and producers in the market. In Aldrich’s and Ruef’s (2011) terms, the two organizations, incumbent and entrant platform, can be seen entering into a commensalistic relationship that may involve both cooperation and competition to different extents. In the following sections we outline in more depth digital platform ecosystems and traditional approaches to platform competition, followed by the remainder of the study which focuses on the emergence of opportunistic platform entry strategies.

**Digital platform ecosystems**

The classic economic logic views platforms as multisided markets that enable direct interactions between two or more interacting sides (e.g., Hagiu, 2014; Hagiu and Wright, 2015). In this view, platforms are conceptualized as interfaces that serve to mediate transactions between the sides, such as networks of buyers and sellers or complementors and users (McIntyre and Srinivasan, 2017; Rochet and Tirole, 2003). This mediating function enables parties to interact and create value. However, recent literature has further defined various types of digital platform markets given that they lend themselves to distinctly different economic and strategic logics. Cennamo (2019) distinguishes between multisided transaction markets, which focus on connecting transactions across different sides (e.g., Amazon Marketplace and Uber), complementary innovation markets, which refer to platform ecosystems that facilitate complementors’ innovation and integrated offerings to end users (e.g., Apple iOS and Google Android), and information markets, which facilitate users’ information search and exchange (e.g., Twitter, Facebook, and Google Search). The current study examines the second of these types—the complementary innovation markets. This category often involves the tension we pointed out in the introduction: the need that incumbent platform ecosystems facilitate openness to achieve generativity, which then results in potential vulnerability to entrant platforms’ opportunistic moves.

Platforms that correspond with complementary innovation markets involve three central features: the platform core, boundary resources, and complements (as depicted in Fig. 1). Together with users and complementors, these elements comprise the platform ecosystem. The unique competitive advantage of platform ecosystems lies in their ability to provide a coordination structure that integrates the specific complements (Jacobides et al., 2018). In this view, the digital platform—often operated by a platform leader (Gawer and Cusumano, 2008)—plays the role of the hub or central point of control, around which the multisided ecosystem of users and complementors is formed (e.g., Thomas et al., 2014). The platform leader is typically the owner of the platform core, which technically refers to an extensible codebase to which third-party complements can be added, along with the interfaces through which they interoperate (Baldwin and Woodard, 2008; Reuver et al., 2017; Tiwana et al., 2010). We additionally draw a distinction between complementors and complements (cf. McIntyre and Srinivasan, 2017), wherein the former refer to the organizational or individual actors (e.g., app developers) who provide value-creating content to the platform users and wherein the latter are individual units of such content (e.g., apps). In this study, we highlight a third crucial aspect that is often not discussed in the strategy literature—that is, the role of the platform’s boundary resources (Ghazawneh and Henfridson, 2013). These resources refer to the broad variety of interfacing and supporting resources, including APIs, software development kits (SDKs), and marketplaces that enable complementors to provide value-adding complements to the platform. In a digital platform ecosystem, complements are innovated at arm’s length, which means

---

1 In these types of relationships, the two platform ecosystems focus on similar environments (e.g. regarding potential users and complementors), but their relationship differs from full competition to full mutualism. This allows also for asymmetric relationships such as those where one ecosystem can benefit from the presence of other, while for other there is no benefit (partial mutualism).
the interfaces between the platform core and complements are not only technical design rules (Baldwin and Clark, 2000), but become de facto boundary resources.

In the context of digital platform ecosystems, value creation is achieved by leveraging interactions between various sides of the market (Thomas et al., 2014). This value creation process crucially relies on the platform’s ability to both attract a sufficient number of users and complementors and generate cross-side network effects among these groups (Eisenmann et al., 2006; Parker and Van Alstyne, 2005). To attract third-party contributions and foster innovation, boundary resources can be utilized to open the platform in two ways (Boudreau, 2010; Karhu et al., 2018). First, platform owners can open access for third parties to contribute complements by offering APIs and SDKs. Second, to further foster cooperation with complementors, platform owners can open and share platform core resources and intellectual property rights (IPRs) by means of open-source licenses (Barnett, 2011; West, 2003). However, as we shall later demonstrate, the more open a platform is, the more vulnerable it becomes to opportunistic competition.

In addition to facilitating value creation, platform owners must design governance mechanisms related to value capture by describing the revenue models and rules for how different parties can benefit and profit from their platforms (Eisenmann et al., 2006; Tura et al., 2018). The majority of the existing platform strategy research (e.g., Hagiu, 2014; Tiwana, 2013) assumes that platform owners and complementors distribute value based on mutually enforced pricing and other rules (that are often specified by the platform leader) as well as by way of market mechanisms in which the complementors’ value is defined by user transactions. For these purposes, platform owners can establish alternative kinds of boundary resources, such as marketplace and monetization mechanisms (e.g., in-app purchases). The revenue stream itself might be based on any number of models, such as subscriptions or one-time user purchases, or advertising (see e.g., Casadesus-Masanell and Zhu, 2013, 2010). The platform leader can also choose to restrict its business to certain segments, thus allowing complementors to conduct business in other segments (e.g., Eisenmann et al., 2008; Gawer and Cusumano, 2008). For example, Google’s Android business generates profit from advertisement services and marketplace revenues, leaving device sales mainly for Open Handset Alliance (OHA) manufacturers and returning 70% of marketplace revenues to the complementors. Importantly, it is broadly assumed in the literature (as well as in practice) that all actors in platform ecosystems have participated in both value creation and capture within the boundaries of a particular ecosystem. That is, they have competed for their share of value capture according to mutually enforced rules and governance schemes as well as individual complementors’ ability to attract users and generate revenue.

Competition in digital platform markets and the emergence of opportunistic entry strategies

Platform ecosystems have traditionally been perceived to compete via a winner-take-all logic, wherein the size of user and complementor networks and early entry are important for capturing markets (Schilling, 2002). In this view, same-side and cross-side network effects create barriers for new platforms that seek to enter the same markets. Platforms compete using resources they have created themselves, and competitive value capture occurs within markets for users and complementors. In this context, one important determinant of platform competition is that users and complementors may either multihome or switch between platforms (Caillaud and Jullien, 2003; Rochet and Tirole, 2006). Platform competition also takes place according to the distinctiveness logic, which defines the platform’s specific features and complements based on its architecture and scope in the markets (Cennamo, 2019). In this regard, differentiation (e.g., in quality, price, and niche) toward users and complementors may also explain why actors opt to switch between competing platforms or decide to multihome (Landsman and Stremersch, 2011). The dominant platform ecosystems often combine both of these logics. For instance, the Google Android and Apple iOS ecosystems compete both on the size of their end-user and complementor networks (i.e., the winner-take-all logic) as well as within the specific features of their platform architectures and scopes.

Fig. 1. A conceptual model of the platform ecosystem and competition between incumbent and entrant platforms.
Even if the dominant platform ecosystems enjoy significant benefits from their accumulated network sizes or unique identities, entrant platforms nevertheless have some means for challenging incumbents—sometimes even with later entry. These “traditional platform competition strategies” fall into three approaches. Head-to-head strategies relate to pure winner-take-all logics where the user and complementor bases are important for accumulating more of each (Schilling, 2002). Distinct positioning (Cennamo and Santalo, 2013) is a strategy where the platform differentiates itself from competitors, typically via higher quality (Shankar and Bayus, 2003; Zhu and Iansiti, 2012), via specific functionality, or a particular scope of users or complementors. Platform envelopment relies on developing similar platform services to serve an overlapping user base (Eisenmann et al., 2011). All these strategies involve considerable investments in value creation: upfront and recurring investments into the platform core and boundary resources, high multifaceted costs for complementors, and switching costs that render user acquisition difficult.

In the current study, we argue that, in addition to these previously discussed strategies, a new sub-category of platform competition that allows entrants to exploit its rival platforms’ resource bases is being increasingly witnessed in digital platform markets. In essence, some platforms have demonstrated that it is possible to “slice the cake without baking it”—that is, capture value without participating in the value creation efforts regarding initial resource bases and infrastructures of the incumbent platform ecosystem. In the remainder of this study, we focus on these types of entry strategies, which are largely overlooked in the existing platform strategy literature. For example, Parker et al. (2009) identify code forking and incompatibility as challenges for platforms, while Pon et al. (2014) refer to proprietary platforms built upon Android. Further opportunistic strategies have been noted in both industry practice and information systems research, including “platform forking” (Karhu et al., 2018) and “meta-platforms” (Ghazawneh and Henfridsson, 2013), although none of these studies systematically consider these strategies from the market entrant’s perspective.

We argue that all these examples are opportunistic entry strategies into digital platform markets with a common thread in relying on the specific nature of incumbent ecosystems’ platform resources. Digital platform ecosystems are a specific kind of organizing structure that is particularly useful for accelerating complementor innovation (Cennamo, 2019; Jacobides et al., 2018) although for the same reasons exposes its resource base for various types of opportunistic entry strategies. In fact, creating value via such digital resources is intrinsically linked to the enabling other actors to access those resources (see e.g., Amit and Han, 2017; Yoo et al., 2010); in other words, the value of digital resources tends to be higher when they are widely shared. Indeed, the existence of opportunistic entry strategies into digital platform markets is enabled by the distinct nature of digital platform resources. Digital resources—including the platform core and its boundary resources—are essentially bundles of software and data. From the resource-based standpoint, these types of resources can be considered highly codified and explicit, thus resulting in high transferability, capacity for aggregation, and easiness of appropriability (Grant, 1996). The transferability of such resources nearly renders them a public good in that, after their creation, they can be consumed by additional users at nearly zero marginal costs. The capacity for aggregation relates to the use of a common language between sources and recipients of the provided knowledge (which further promotes transferability of digital resources). Finally, easiness of appropriability refers to the nature of codified (and digital) resources as public or non-rivalrous goods in that they can be resold without losing their value, and it is often necessary to expose such resources before they are sold to confirm their value to the buyers (Arrow, 1971, 1984).

The emerging examples of opportunistic entry strategies demonstrate that the features of digital resources are indeed not only useful for accelerating complementor innovation in digital platform ecosystems (since they facilitate resources’ transferability and aggregation potential), but they also expose the incumbent platforms to entrant strategies that exploit the platform’s core and boundary resources (thereby utilizing the easiness of appropriability). The remainder of this paper focuses on clarifying how such opportunities alter the platform competition landscape and develops a three-tier categorization for opportunistic entry strategies in digital platform markets.

Methodological approach

Given the emerging case-based evidence of opportunistic entry strategies and the simultaneously scant integrative theoretical attention of those from the platform competition perspective, we chose an interpretative synthesis of existing case studies (Rauch et al., 2014) as our methodological approach. Among alternative approaches for the qualitative integration of existing evidence (i.e., aggregation, integration, and interpretation), the interpretative approach is particularly strong when the existing cases are neither homogeneous nor analyzed from similar perspectives (see Rauch et al., 2014 for discussion). Therefore, our intention is to re-interpret the existing evidence, supplement it with new evidence of recent activities, and finally draw theoretical inferences to a broader debate on platform competition and entry strategies. To structure our research approach, we draw from Hoon’s (2013) suggestions regarding meta-syntheses in organizational research that are particularly applied within the context of our interpretative approach.

Following Hoon (2013), we started from our research motivation regarding the emergence of opportunistic platform entry strategies in digital markets. This started by defining the inclusion criteria for our theory-based sampling (Suri, 2011). We sought to find evidence of platform competition in digital markets that correspond with the “complementary innovation markets” as defined by Cennamo (2019) and in which an entrant platform applies an opportunistic entry strategy. In this regard, we found that several recent case studies recognize the existence of and the competitive tensions related to such strategies (e.g., Eaton et al., 2015; Ghazawneh and Henfridsson, 2013; Karhu et al., 2018). However, we realized that this existing literature does not converge around the idea that these entry strategies fall into three approaches. Head-to-head strategies relate to pure winner-take-all logics where the user and complementor bases are important for accumulating more of each (Schilling, 2002). Distinct positioning (Cennamo and Santalo, 2013) is a strategy where the platform differentiates itself from competitors, typically via higher quality (Shankar and Bayus, 2003; Zhu and Iansiti, 2012), via specific functionality, or a particular scope of users or complementors. Platform envelopment relies on developing similar platform services to serve an overlapping user base (Eisenmann et al., 2011). All these strategies involve considerable investments in value creation: upfront and recurring investments into the platform core and boundary resources, high multifaceted costs for complementors, and switching costs that render user acquisition difficult.

In the current study, we argue that, in addition to these previously discussed strategies, a new sub-category of platform competition that allows entrants to exploit its rival platforms’ resource bases is being increasingly witnessed in digital platform markets. In essence, some platforms have demonstrated that it is possible to “slice the cake without baking it”—that is, capture value without participating in the value creation efforts regarding initial resource bases and infrastructures of the incumbent platform ecosystem. In the remainder of this study, we focus on these types of entry strategies, which are largely overlooked in the existing platform strategy literature. For example, Parker et al. (2009) identify code forking and incompatibility as challenges for platforms, while Pon et al. (2014) refer to proprietary platforms built upon Android. Further opportunistic strategies have been noted in both industry practice and information systems research, including “platform forking” (Karhu et al., 2018) and “meta-platforms” (Ghazawneh and Henfridsson, 2013), although none of these studies systematically consider these strategies from the market entrant’s perspective.

We argue that all these examples are opportunistic entry strategies into digital platform markets with a common thread in relying on the specific nature of incumbent ecosystems’ platform resources. Digital platform ecosystems are a specific kind of organizing structure that is particularly useful for accelerating complementor innovation (Cennamo, 2019; Jacobides et al., 2018) although for the same reasons exposes its resource base for various types of opportunistic entry strategies. In fact, creating value via such digital resources is intrinsically linked to the enabling other actors to access those resources (see e.g., Amit and Han, 2017; Yoo et al., 2010); in other words, the value of digital resources tends to be higher when they are widely shared. Indeed, the existence of opportunistic entry strategies into digital platform markets is enabled by the distinct nature of digital platform resources. Digital resources—including the platform core and its boundary resources—are essentially bundles of software and data. From the resource-based standpoint, these types of resources can be considered highly codified and explicit, thus resulting in high transferability, capacity for aggregation, and easiness of appropriability (Grant, 1996). The transferability of such resources nearly renders them a public good in that, after their creation, they can be consumed by additional users at nearly zero marginal costs. The capacity for aggregation relates to the use of a common language between sources and recipients of the provided knowledge (which further promotes transferability of digital resources). Finally, easiness of appropriability refers to the nature of codified (and digital) resources as public or non-rivalrous goods in that they can be resold without losing their value, and it is often necessary to expose such resources before they are sold to confirm their value to the buyers (Arrow, 1971, 1984).

The emerging examples of opportunistic entry strategies demonstrate that the features of digital resources are indeed not only useful for accelerating complementor innovation in digital platform ecosystems (since they facilitate resources’ transferability and aggregation potential), but they also expose the incumbent platforms to entrant strategies that exploit the platform’s core and boundary resources (thereby utilizing the easiness of appropriability). The remainder of this paper focuses on clarifying how such opportunities alter the platform competition landscape and develops a three-tier categorization for opportunistic entry strategies in digital platform markets.

Methodological approach

Given the emerging case-based evidence of opportunistic entry strategies and the simultaneously scant integrative theoretical attention of those from the platform competition perspective, we chose an interpretative synthesis of existing case studies (Rauch et al., 2014) as our methodological approach. Among alternative approaches for the qualitative integration of existing evidence (i.e., aggregation, integration, and interpretation), the interpretative approach is particularly strong when the existing cases are neither homogeneous nor analyzed from similar perspectives (see Rauch et al., 2014 for discussion). Therefore, our intention is to re-interpret the existing evidence, supplement it with new evidence of recent activities, and finally draw theoretical inferences to a broader debate on platform competition and entry strategies. To structure our research approach, we draw from Hoon’s (2013) suggestions regarding meta-syntheses in organizational research that are particularly applied within the context of our interpretative approach.

Following Hoon (2013), we started from our research motivation regarding the emergence of opportunistic platform entry strategies in digital markets. This started by defining the inclusion criteria for our theory-based sampling (Suri, 2011). We sought to find evidence of platform competition in digital markets that correspond with the “complementary innovation markets” as defined by Cennamo (2019) and in which an entrant platform applies an opportunistic entry strategy. In this regard, we found that several recent case studies recognize the existence of and the competitive tensions related to such strategies (e.g., Eaton et al., 2015; Ghazawneh and Henfridsson, 2013; Karhu et al., 2018). However, we realized that this existing literature does not converge around the idea that these
strategies would form a distinct category within platform competition strategies, nor does it consider whether such strategies would possess general features and sub-categories or logics. Rather, the literature perceives the opportunistic strategies through overarching labels, such as “meta-platform” (Ghazawneh and Henfridsson, 2013), “the migration of [an] installed base” (Eaton et al., 2015), and “platform forking” (Karhu et al., 2018). In total, we identified six published studies that demonstrate some aspects of opportunistic platform entry strategies (for a summary, see Table 1). We additionally collected supplementary evidence that helped us support our interpretations regarding the entry strategies, including recent court rulings, platform governance clauses, and corporate communications. We analyzed these data via our initial conceptual understanding of a digital platform ecosystem as comprising a core, boundary resources, and complements (see Fig. 1). We further examined the details of the opportunistic strategic moves that targeted these incumbent platform resources through a qualitative process that involved the author team in drawing and debating interpretations and emergent categories of platform competition strategies. Each case was firstly individually analyzed, and cross-case commonalities and differences were secondly compared and contrasted. Based on this analysis, general patterns of platform competition strategies emerged, thus resulting in three broad categories of opportunistic entry strategies: platform exploitation, platform pacing, and platform injection. Finally, based on the synthesis of our findings, we built a theoretical framework that links the results back to the literature and generalizes them to the broader discussion of platform competition.

Table 1 summarizes the cases that are interpreted in light of our research aim and depicts the three categories that emerged from our analysis. In the table, a brief summary of each case is offered, focusing on the distinctive features as they relate to our core findings.

Three opportunistic entry strategies to digital platform markets

This section explores how a platform entrant opportunistically exploits an incumbent’s resources to compete in platform-based markets without participating in the initial creation of relevant resources. In the following analysis, we distinguish three approaches that can be taken to implement an opportunistic platform entry strategy: platform exploitation, platform pacing, and platform injection. A cross-case analysis revealed that each strategic approach targets or operates on specific parts of the incumbent’s platform resources: the core, boundary resources, complements, or its user base. Table 2 summarizes the evidence across cases regarding the platform resources exploited and implemented for each strategic approach, and we discuss the distinctive characteristics of each in the following subsections. To ground our conceptual analysis in a real-world platform ecosystem context, we apply the reinterpretations as well as supplementary evidence of the case examples throughout to illustrate each approach.

Platform exploitation

Developing a digital platform core from scratch requires time and money. For instance, according to Barnett (2011, p. 1882), “development costs for a substantial upgrade to an operating system typically reach several billions of dollars.” Additionally, as discussed in the conceptual section, digital resources are more easily transferred and aggregated, and therefore more prone to opportunistic exploitation. If an incumbent opens its platform core resources—by, for example, forfeiting IPRs by issuing an open-source license (Barnett, 2011; West, 2003)—an entrant can take advantage of these resources to avoid significantly upfront investments in its own platform core. While the entrant is not necessarily violating any license or law, this approach can be characterized as platform exploitation if the entrant uses the resources in a non-reciprocal way and seeks to compete with the incumbent in the same business. This circumstance is highly visible in the Amazon Fire case, which we refer to as a first case to illustrate the platform exploitation approach. We additionally discuss the Jolla Sailfish case, which illustrates a partial approach to exploitation.

Amazon Fire

With the rapid growth of the tablet and digital content market, Amazon—a significant player in the digital content business (e-books and movies)—decided to enter the market and introduced its Amazon Fire platform and tablet. Rather than building its own platform from scratch or acquiring technology (as Google had done), Amazon took the platform exploitation approach and utilized the resources accessible through Google’s AOSP. Thanks to early work by hacker communities around Android, such as CyanogenMOD and Chinese device maker Xiaomi, Amazon was able to exploit the Android platform to build its competing device outside the Google-controlled OHA. A precondition for this move was of course that Google had decided to open source its platform to attract hardware manufacturers to join its ecosystem. It is worth noting here that Google specifically chose a permissive Apache license that does not require reciprocity in contrast to the General Public License (GPL). The Apache license’s version 2.0 terms’ state: “[You may provide additional or different license terms and conditions for use, reproduction, or distribution of your modifications.” Importantly, permissive terms allow partnering manufacturers to keep their add-ons (e.g., Samsung TouchWiz) closed source to differentiate themselves from their competitors. However, due to the permissive licensing terms, a competing platform such as Amazon could additionally construct a derivative Fire platform without contributing to the AOSP—that is, without contributing value creation aspects (e.g., codebase improvements) to the Android platform. Furthermore, Amazon continues to exploit new AOSP versions as they are published.

Jolla Sailfish

The global smartphone and tablet market is currently dominated by Google Android, Apple iOS, and Android-based “platform

---

3 See https://www.apache.org/licenses/LICENSE-2.0.
Table 1

<table>
<thead>
<tr>
<th>Entrant platform</th>
<th>Reinterpretation of existing studies</th>
<th>Supplementary evidence</th>
<th>Key features of the case examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platform exploitation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amazon Fire</td>
<td>(Appleyard and Chesbrough, 2017; Karhu et al., 2018; Pon et al., 2014)</td>
<td>Open-source license terms</td>
<td>To enter the tablet market, Amazon exploited the full Android Open Source Project (AOSP) to build a competing Amazon Fire platform ecosystem.</td>
</tr>
<tr>
<td>Jolla Sailfish</td>
<td>Karhu et al. (2018)</td>
<td>Corporate communications</td>
<td>Jolla used a partial exploitation approach by taking and integrating only the Android runtime from AOSP into its distinct platform core.</td>
</tr>
<tr>
<td><strong>Platform pacing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amazon Fire</td>
<td>See above</td>
<td>Terms &amp; conditions, Open-source license terms</td>
<td>To build a full platform (including complements), Amazon paced Google APIs to enable developers to multihome to its platform at costs close to zero.</td>
</tr>
<tr>
<td>Google Android</td>
<td>(Karhu et al., 2018; Menell, 2016)</td>
<td>Court rulings</td>
<td>To enter the smartphone market dominated by Apple, Google decided to clone Java APIs into its new Android platform to make it as easy as possible for developers to start developing Android apps. Notably, in this case, Google did not aim to exploit the existing Java apps as such, but instead aimed to lower the barrier for existing Java developers to become complementors for the Android platform.</td>
</tr>
<tr>
<td>Jolla Sailfish</td>
<td>See above</td>
<td>Corporate communications</td>
<td>Jolla did not only pace developer side, but also hardware interfaces and thus enabled two complementor sides of Android—developers and hardware manufacturers—to multihome to its platform.</td>
</tr>
<tr>
<td><strong>Platform injection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amazon Fire</td>
<td>See above</td>
<td>Terms &amp; conditions</td>
<td>Amazon tried to inject the Amazon App Store into Google Play to offer digital content from the Fire platform to Android users. Google resisted and forced Amazon to retract.</td>
</tr>
<tr>
<td>Adobe Flash</td>
<td>(Eaton et al., 2015; Ghazawneh and Henfridsson, 2013)</td>
<td>Corporate communications</td>
<td>With its Flash business threatened by the introduction of iPhone apps, Adobe wrestled with Apple to enable Flash platform inside the iOS platform. Apple resisted, but eventually Flash was partially allowed into iOS although it had already become obsolete at that point.</td>
</tr>
</tbody>
</table>
forks,” such as Amazon Fire. Microsoft performed a significant market entry with its Windows Phone platform but in spite of the vast resources it retracted from the market few years ago. It is worth noting here that Microsoft tried market entry with a traditional head-to-head platform strategy by developing its own platform core. Interestingly, one of the few platforms still attempting to challenge the incumbents is Jolla Sailfish, which has instead incorporated an opportunistic approach in its platform strategy. Jolla has built its platform core by using open-source resources from the Mer project (previously known as Nokia MeeGo) but has also exploited some parts of the platform core from AOSP to keep its platform Android compatible. The key module it has exploited is Android Runtime Environment (ART). Having ART as a subsystem in its core, the Sailfish OS is capable of running both Native Sailfish and Android applications.

Platform exploitation deviates from communal open-source activities in that it is not reciprocal and entrants seek to compete in the platform business with the incumbent. What’s even worse (from incumbent point of view), versions that are not fully compatible fragment the ecosystem, as is illustrated by Google’s response to Acer and Alibaba’s exploitation attempt (Quote reported by Arstechnica4 on Sep 15, 2012): “Compatibility is at the heart of the Android ecosystem and ensures a consistent experience for developers, manufacturers and consumers. Non-compatible versions of Android, like Aliyun, weaken the ecosystem. All members of the Open Handset Alliance have committed to building one Android platform and to not ship non-compatible Android devices. This does not however, keep OHA members from participating in competing ecosystems [e.g., Windows Phone].”

To build a complete platform that also involves complements, the platform exploitation approach is not sufficient on its own, and the entrant must also attract complementors to the platform. A platform entrant can try to build another developer ecosystem—as Microsoft unsuccessfully attempted with the Windows Phone platform—or complement platform exploitation with another opportunistic approach, referred as platform pacing, which is discussed in the following subsection.

Platform pacing

After building the platform core, a common and difficult problem for any entrant involves solving the chicken-and-egg problem: how to attract to the platform one side of the cross-side network effect in order to attract the other side (cf. Caillaud and Jullien, 2003). With platform pacing, the entrant can pace the incumbent’s boundary resources to make multihoming as easy as possible for complementors and eventually attract users to switch to the entrant’s own platform. In practice, pacing means the entrant makes an exact copy of all boundary resources upon which complements depend (e.g., APIs) such that, from the complementor’s perspective, the platform looks exactly the same as the incumbent’s platform, and thus the costs for multihoming are nearly zero. Pacing also involves a strategy in which the entrant continuously keeps up with changes in the incumbent’s boundary resources, such as new features in its APIs. Thus, platform pacing benefits from the exact and codified nature of digital resources, as the dependencies between the core and complements facilitate an easier transfer between platforms. We illustrate the platform pacing approach below by reflecting upon three case examples. Amazon Fire carries on the analysis from our first example because it demonstrates why platform pacing is often combined with platform exploitation. Secondly, we discuss Google Android versus Oracle Java to illustrate how pacing need not always be a perfect replica and that it can be employed even though core would be mostly distinct. Thirdly, we revisit the Jolla Sailfish

---

<table>
<thead>
<tr>
<th></th>
<th>Platform exploitation</th>
<th>Platform pacing</th>
<th>Platform injection</th>
</tr>
</thead>
</table>
| **Users**        | Not targeted directly | Not targeted directly | Expanded to incumbent’s market:  
|                  |                       |                | • digital apps and content (Adobe, Amazon) |
| **Complements**  | Not targeted directly | Attracted to multihome:  
|                  |                       |                | • app complements (Amazon, Jolla)  
|                  |                       |                | • developer complementors (Android)  
|                  |                       |                | • hardware complements (Jolla)  
| **Boundary**     | Not targeted directly | Paced boundary resources:  
| resources        |                       |                | • API (Amazon, Android, Jolla)  
|                  |                       |                | • HAL (Jolla)  
| **Platform core**| Exploited core resources:  
|                  | • AOSP (Amazon)       | Not targeted directly | Injected boundary resource:  
|                  | • ART (Jolla)         |                | • SDK (Adobe)  
| **Value creation**| By exploiting one or multiple resources within incumbent’s  
| implications     | platform core, entrant can avoid (most) upfront value-  
|                  | creation investments. |                | • Marketplace (Amazon)  
| **Value capture**| Entrant needs to build its own platform ecosystem (using  
| implications     | traditional platform competition logic) or rely on a  
|                  | combination with other opportunistic platform strategies. |                | • Android (Amazon)  
|                  |                       |                | • iOS (Adobe)  
|                  |                       |                | By injecting its own boundary resource (e.g. app store) within an  
|                  |                       |                | incumbent platform, entrant can avoid market build-up and instead  
|                  |                       |                | reach incumbent’s existing user or complementor side.  
|                  |                       |                | Entrant directly competes from the value capture within the  
|                  |                       |                | incumbent’s platform ecosystem. |
case to exemplify how a market entrant can pace not one, but two complementor sides in a multisided platform.

**Amazon Fire**

To become a complete platform ecosystem, Amazon also needed to gain access to app complements. However, official Android apps were not available because the Google Play store was exclusively licensed for certified Android devices. Further, Amazon could not employ the hacking approach used by community-based startups, such as CyanogenMod. Thus, to solve the remaining chicken-and-egg problem in building its Fire platform, Amazon employed a *platform pacing* approach. In order for pacing to be successful in attracting developers to multihome, Amazon needed to completely replicate all APIs that Android was offering to its developers. Standard Android APIs and their implementations are included in the AOSP, but the mapping API and its backend—important boundary resources for a significant portion of app developers—are not available in AOSP. However, the HERE mapping platform, a competitor of Google Maps previously owned by Nokia that is now owned by a consortium of car manufacturers, was offering both a compatible API and the backend as a licensable package. Finally, for multihoming to be viable from a business perspective, an important precondition is that the incumbent platform must allow complements to be sold in any third-party marketplaces. Google allows this in its developer policies, which states: “You can distribute your apps through any app marketplace you want or use multiple marketplaces.” Thus, Amazon was able to establish its own Amazon App Store boundary resource. The Amazon Fire case illustrates that an exact and complete cloning of all interfacing boundary resources is necessary for platform pacing to succeed. When this is achieved, complementing digital resources may be indirectly exploited by making multihoming to the entrant’s platform virtually cost free for complementors.

As evidence of competition, Amazon competes with the Android platform ecosystem for digital content sales and with OHA manufacturers for device sales, including Google’s own Pixel products. Amazon also diverts user data to its platform, thereby undermining Google’s advertising and search business. For example, Amazon’s use of the HERE mapping platform competes with Google in monetizing complementary location data. As such, this case also illustrates that, as is the case for software, data and information—the other main elements of digital platforms—are also valuable assets that can be targeted by opportunistic strategies.

**Google Android**

When Google was launching its Android platform, Apple iOS had already entered the market and was rapidly gaining market share through its App Store. Google’s immediate challenge was to solve the chicken-and-egg problem: how to get crucial app developer complementors on board to attract the user side. At that time, Java was among the most popular languages for developing applications. Google solved the problem with *platform pacing* by copying the best elements of the Java APIs (owned at the time by Sun Microsystems and now owned by Oracle). To facilitate value creation, Google then copied the Java platform’s API boundary resources to attract the complementors (i.e., app developers) to switch to its Android platform.

Oracle, which currently owns the Java IPRs, reacted against this action by suing Google in court for infringing its IPRs and thereby evidencing the hostility of Google’s move. The court proceedings are still ongoing, but the Supreme Court has thus far confirmed that the sequence, structure, and organization (SSO) of a large API possesses copyright. Furthermore, in a recent second round of the trial, the United States Court of Appeals for the Federal Circuit concluded that “Google’s use of the Java API packages was not fair as a matter of law, we reverse the district court’s decisions denying Oracle’s motions for JMOL and remand for a trial on damages.” Specifically, to counter Google’s fair use claim, the court’s in-depth reasoning refers to “unrebutted evidence that Google specifically designed Android to be incompatible with the Java platform and not allow for interoperability with Java programs.”

Google’s purpose was to lower the barrier for developers or, as elaborated in the court proceedings: “to capitalize on the fact that software developers were already trained and experienced in using the Java API packages at issue.” As a matter of fact, Google itself admitted in court: “it was a sound business practice for Google to leverage the existing community of developers, minimizing the amount of new material and maximizing existing knowledge.” From a resource-based perspective, it is important to note that, in this case, Google did not target Java apps directly, but rather utilized Java to attract the complementor base to switch to the Android ecosystem. This approach contrasts the earlier Amazon Fire case, in which the complete Android APIs were cloned to enable complementors’ direct multihoming of their existing Google API-based apps and services without making major modifications to the competing platform.

Regarding platform competition, GoogleAndroid’s introduction and subsequent success undermined the Java licensing business in which Sun intended to engage in the mobile space. The court judgment (referred to above) confirms the competitive stance by asserting that “Android competed directly with Java SE in the market for mobile devices is sufficient to undercut Google’s market harm arguments.” While Google makes its money from advertising revenues rather than licensing, it still indirectly affected Sun’s Java business and may therefore be considered to have taken a competitive move.

In summary, the ongoing litigation has clearly established that copying and using significant enough APIs in a competitive manner as part of the platform pacing approach without adhering to the open-source license conditions is considered illegal. It is important to note herein that, while Google did not adhere to the GPL license conditions for the Java APIs, Amazon did nothing illegal in its earlier case of pacing Android, as it completely adhered to Android’s permissive Apache license. Overall, Google’s imitation of Java APIs has proven an extremely successful strategy that has contributed toward rapidly growing a complementor base that has produced more than three million apps to date.

---

**Jolla Sailfish**

In contrast with earlier cases, the Jolla case illustrates how, as a multisided-platform with more than one complementor side, an entrant can pace multiple sides of the incumbent. Google Android has two complementor sides—app developers and device manufacturers—for which Android provides two distinct boundary resources: APIs and a hardware abstraction layer (HAL), respectively. Similarly as in the earlier cases, Jolla utilizes the *platform pacing* approach regarding the app developer-facing boundary resources (e.g., APIs). Distinctly from earlier cases, Jolla also paces HAL boundary resources upon which device manufacturers depend. In terms of value creation, Jolla’s use of a multisided pacing approach has enabled both Android developers and device manufacturers to multihome their complements to the Jolla ecosystem. This case also illustrates that successful platform pacing does not require that the entrant possess the same platform core as the incumbent (in this example, Jolla uses Linux-based Mer). With digital resources, converters (Farrell and Saloner, 1992) and other types of resources may be used behind the cloned APIs to render them compatible with entrant possess the same platform core as the incumbent (in this example, Jolla uses Linux-based Mer). With digital resources, converters (Farrell and Saloner, 1992) and other types of resources may be used behind the cloned APIs to render them compatible with.

**Platform injection**

Building a competitive platform ecosystem by exploiting an incumbent’s platform core and/or pacing its boundary resources still demands significant efforts. A third and less resource-intensive approach is *platform injection*, in which an entrant injects its own boundary resources into the incumbent’s platform and ecosystem. Platform injection aims to benefit from the incumbent platform’s ecosystem and resources and thereby establish a competing platform inside that ecosystem (i.e., effectively injecting it within the incumbent platform). We illustrate this approach by referring to two cases—Adobe Flash on Apple iOS and, again, the Amazon Fire case—that demonstrate how an entrant can inject boundary resources that it has developed for its own platform back into the incumbent’s platform.

**Amazon Fire**

Amazon made a further opportunistic move by utilizing the *platform injection* approach, whereby it injected its Amazon Shopping app from its own platform back into Google Android by publishing the app on Google Play. Importantly, Amazon Shopping App included both physical and digital content (from the Fire platform), such as movies and apps, that were also compatible with the Android platform. This move allowed Amazon to avoid value creation inputs related to market creation while simultaneously expanding into the Android market through a back door. From a platform competition perspective, Amazon competed directly with Google by offering its own digital content on Google Play. Google defended the move by altering the Google Play Developer Distribution Agreement on September 25, 2014 to prevent apps from selling software applications and games for use on Android devices: “4.5 You may not use Google Play to distribute or make available any Product that has a purpose that facilitates the distribution of software applications and games for use on Android devices outside of Google Play.” Subsequently, Amazon modified its app to adhere to these terms.

**Adobe Flash**

When Apple’s iPhone and App Store were launched, Adobe Flash was at that time the *de facto* standard for developing interactive web apps. When the App Store started booming, Adobe recognized that the store threatened its own position in the app business and as such decided to enter the iOS market via *platform injection*. As a first attempt of platform injection, Adobe attempted to inject its Flash plug-in into the iOS platform and Safari browser. Apple prevented this by claiming Flash was too demanding for iPhone hardware resources (e.g., battery power). In its second attempt, Adobe built a cross-code compiler that enabled developers to compile their existing Flash apps as native iOS apps. Apple initially resisted this approach, and Steve Jobs argued in a blog post that “[a cross-compiler] may not adopt enhancements from one platform unless they are available on all of their supported platforms. Hence developers only have access to the lowest common denominator set of features.” However, Apple eventually allowed cross-compilers due to a Federal Trade Commission (FTC) intervention (for details, see Eaton et al., 2015). Similar to the Amazon Fire case, by injecting targeted boundary resources into the incumbent’s platform, an entrant can attempt to avoid value creation inputs related to the platform core while reaching the incumbent’s existing complementor population and user market. In terms of platform competition, this attempt can be perceived as Adobe’s desire to extend its SDK licensing business to iOS developers while also enabling iOS developers to multihome their apps to other platforms that support Flash.

---

7 See https://www.apple.com/hotnews/thoughts-on-flash/.
8 See https://play.google.com/about/developer-distribution-agreement.html.
9 See https://www.apple.com/hotnews/thoughts-on-flash/.
Opportunistic versus traditional platform competition

As we have demonstrated thus far, platform exploitation, pacing, and injection are not cooperative strategies that use open-source or other open resources, but are a new category of opportunistic platform competition strategies. All our cases illustrate a particular competitive stance between the entrant and the incumbent; Google Android targeted Java’s emerging smart phone licensing market, Amazon Fire introduced a competing tablet for a digital content market against Google’s Android business, Jolla Sailfish targeted a sub-segment of Google’s tablet and smart phone market, Adobe Flash tried to capture part of Apple’s booming iPhone app development business, and Amazon Apps was Amazon’s attempt to capture part of the digital content business inside the Android platform.

This new category of competitive strategies is defined by the opportunistic approach featured by these strategies to acquire resources in the incumbent’s platform ecosystem: the core, boundary resources, complements, and the user base. Fig. 2 illustrates the well-known categories of “traditional” platform competition strategies alongside their challenges related to these resources (left-hand side) and the new opportunistic platform competition strategies that offer solutions to potentially overcome those challenges (right-hand side). In the figure, we have stylized traditional platform strategies as head-to-head (i.e., “pure” winner-take-all), platform envelopment (Eisenmann et al., 2011), and distinct positioning (Cennamo and Santalo, 2013), each of which face various challenges related to platform market entry: upfront and recurring investments into the platform core and boundary resources, high multihoming costs for complementors, and switching costs that render user acquisition difficult. In contrast, opportunistic strategies avoid upfront investments, diminish multihoming costs, and avoid user market build-up. To summarize how our study answered the research question—what are distinct forms of opportunistic digital platform entry strategies and their boundary conditions?—we next discuss the three strategies in detail alongside the boundary conditions and a combination of several opportunistic approaches into a complete platform entry strategy.

Opportunistic approach to solving the challenges in traditional platform competition

Platform exploitation is a leapfrogging strategy that exploits the incumbent platform core to avoid upfront and recurring investments in platform technology. The modular nature of digital resources (Yoo et al., 2010) provides flexibility for entrants that utilize this strategy; as such, platform exploitation can be confined to the most reusable platform resources and using one’s own value creation inputs on top for differentiation in the market (e.g., Amazon Fire’s custom UI) or by exploiting only part of core (e.g., Jolla exploited only the ART subsystem).

Platform pacing is a temporal replication strategy in which updates of essential boundary resources (e.g., APIs) are kept in pace with the incumbent platform, which allows for lower or even nonexistent multihoming costs for complementors (Eisenmann et al., 2006). Due to network effects, increasing the number of complementors also attracts an increasing number of users and thus eventually helps solve the difficult chicken-and-egg problem (cf. Caillaud and Jullien, 2003) that all new platforms face. Ideally, platform pacing facilitates the virtually direct multihoming of complements to the entrant platform (e.g., Amazon Fire), although this strategy can also be employed to merely lower the barrier for developers to redevelop or re-factor their existing complements to the platform (e.g., Google’s copying of solely core Java APIs). Depending on the case and given the nature of digital resources, multihoming costs may vary from nearly zero (i.e., the interface parity between HERE and Google Maps) to the cost of cross-compiling complements in another programming environment (e.g., Adobe Flash to native iOS) or re-using skill sets to develop complements more quickly (e.g., the use of familiar Java language and APIs in Android). Regarding value creation, smaller multihoming costs require fewer value creation activities at the entrant ecosystem.

Platform injection replicates a platform inside the incumbent ecosystem and in so doing avoids both investing to value creation regarding the platform technology and building the user base. Whereas platform pacing solves the chicken-and-egg problem by initially attracting the complementor side, platform injection typically exploits the incumbent’s existing user base to subsequently attract the complementors to multihome. Of the three approaches, platform injection requires the fewest value creation inputs and is therefore viable for firms that possess limited resources or are testing the market.

Boundary conditions in relation to the incumbent’s platform governance

Each of the identified opportunistic platform strategies has specific boundary conditions that are primarily related to incumbent platforms’ governance decisions (see e.g., Eisenmann et al., 2009; Tura et al., 2018). For platform exploitation to be possible, the incumbent platform core must have naturally been open-sourced; it is worthwhile to note that the platform core may comprise data, content, or software. Software is typically opened through an open-source license and the other two through Creative Commons or similar licenses. License terms set the boundaries for exploitative activities; while permissive licenses require only attribution, reciprocal licenses force the exploiter (entrant) to share all its improvements and additions with the incumbent platform ecosystem. Viral licenses (e.g., GPL) also require add-ons or complements that link to the platform to be shared with the same license. In the digital platform context, the latter kind of enforcement seriously hampers value capture opportunities for the entrant and its partners, although it has never been tested in court.

For platform pacing to be possible, it is also required that the incumbent platform offer its complementor-interfacing boundary

---

10 Following Armstrong’s (2006) logic, we assume herein that the user side is typically single homing and the developer side is multihoming, but all other combinations are naturally also possible.
resources (e.g., APIs) as open source. It is important to note that APIs being “public” by definition is insufficient. As evidenced in the ongoing Oracle versus Google litigation that was discussed earlier, very large APIs enjoy copyright protection and cannot be copied and used under the fair use principle in a competing platform against their licensing conditions. The same license conditions apply herein as those discussed for exploitation in the previous paragraph. Importantly, viral licenses essentially hinder pacing because they force complementors to open up their complements, and complementors thereby lose the opportunity to capture value by keeping their complements proprietary. As a second condition, the incumbent platform must allow its complementors to use alternative market-places. While this decision is currently one that the platform owner can dictate (and thus easily block pacing), the situation is subject to change. Recently, the US Supreme Court held the Court of Appeals decision that consumers could sue Apple in a class action suit for its monopoly on the App Store.

Platform injection is distinct from the other two strategies in that, rather than an entrant building its own platform that it can govern, the entrant injects its platform (or, essentially, boundary resources) inside the incumbent platform and is thus at the mercy of the incumbent’s policies and governance. For this reason, incumbent platforms can more easily resist injection attempts, as evidenced by both the Adobe Flash and Amazon Apps cases. However, as the former case demonstrates, a regulator (e.g., FTC in that case) may often intervene and allow the injection approach to protect fair competition in the market.

Combining several opportunistic strategies in an overall platform entry strategy

While opportunistic platform strategies are distinct, they are not mutually exclusive—as demonstrated by our cases—and thus constitute a typology rather than a taxonomy. A particular platform entry strategy may include several or all of these approaches. Furthermore, these opportunistic strategies can also be employed individually as part of a traditional platform strategy. For this reason, we theorize them as three distinct strategic approaches. In this regard, our study advances and builds upon the work of Karhu et al. (2018), which theorizes platform forking as an overall opportunistic strategy; in our conceptualization, platform forking would refer to a combination of platform exploitation and platform pacing.

As platform forking exemplifies, exploitation alone is typically not sufficient; a platform must additionally employ platform pacing to attract complements. On the other hand, if market differentiation is essential at the core level, pacing can easily be individually applied on top of one’s own platform core resources to exclusively target the incumbent’s complements (e.g., the way Jolla builds its own platform core but exploits complements from the Android platform). While exploitation and pacing are often used in conjunction, the injection strategy is more distinct. However, as the Amazon Shopping app demonstrates, platform injection can also be used after both exploitation and pacing by expanding back into the incumbent’s user population after initially creating one’s own market. Therefore, depending on the entrant’s strategy as well as the incumbent’s platform governance, the identified three strategies can be utilized either individually or in combination to enter platform markets.

Discussion

This study contributes to the platform strategy literature by identifying a new category of platform competition—opportunistic entry strategies in digital markets—that has thus far been scarcely explored. These are strategies wherein the entrant platform can partially or entirely avoid investing in value creation related to platform resources—that is, the platform’s core, boundary resources, and complements. Such opportunities are becoming increasingly available, as digital platform ecosystems aim to attract complementors such as app developers and content providers by exposing their resources (e.g., AOSP). The platform competition literature does not systematically recognize such strategic approaches given its focus on more conventional sources of competitive advantage, such as quality, entry timing, variety, and ecosystem size (as observable in recent literature syntheses by Cennamo, 2019; McIntyre and Srinivasan, 2017). Based on an interpretative case synthesis of the available emergent literature in adjacent fields (see Table 1) as well as supplementary evidence, we have identified a platform competition category that we expect to pose increasing relevance in digital platform markets.

In the strategy literature, “leapfrogging”—or rapid entry into platform markets—primarily focuses on radical innovation or platform envelopment strategies (Eisenmann et al., 2011; Sheremata, 2004). However, both innovative new platforms and “envelopment attacks” require significant upfront investment in value creation and the establishment of platform resources. In contrast, the strategies identified herein—platform exploitation, platform injection, and platform pacing—seek to capture the value already created in incumbent platform ecosystems. Therefore, as leapfrogging strategies, they are less resource intensive and more opportunistic in that they rely on the loose governance and openness of the incumbent platform’s core and boundary resources. Furthermore, in these cases, the entrants can devote more resources and attention to value creation in their own distinctive offerings and brands, as they have saved their initial value creation efforts to develop a platform-based market. However, as some of our case examples demonstrate, these strategies might be contested by the incumbent via changes in platform governance or in the launching of legal action. Given the benefits of platform openness for generativity (Yoo et al., 2012), the identified tensions related to opportunistic entry strategies are likely to remain a considerably relevant issue to account for in the future.

Overall, the present study identifies a number of new issues in relation to platform strategy competition and resource-based explanations in digital platform markets. The following subsection discusses implications for the relevant literature alongside promising

---

future research directions.

Research implications and future directions

For the platform competition literature, our study implies there is an emerging group of opportunistic competitive strategies that rely on vulnerabilities in incumbent platform resources and related governance. Such approaches are not widely recognized in current literature that concerns platform competition in digital markets (for a recent summary, see Cennamo, 2019). Opportunistic platform entry strategies, however, have a number of important implications for platform competition.

First, given the similarity of entrant and incumbent resources, conventional aspects of platform competition, such as network size, quality, and variety (Cennamo and Santaló, 2013; Schilling, 2002), may not sufficiently explain competitive dynamics. Entrant platforms may enter platform markets by utilizing or imitating existing resources to compete head to head from the same users or complements; on the other hand, platform entrants might also utilize some of the opportunistic moves (as identified in our study), while pursuing competition in other markets or focusing on different customer segments. For instance, the platform competition literature recognizes that complementor-side multihoming is not necessarily harmful for platforms with high market share (Landsman and Stremersch, 2011). From an incumbent perspective, some entrant strategies might be perceived to reflect the “generative appropriability” (Ahuja et al., 2013) of a platform ecosystem, wherein future profits are available through the expansion of the overall market and its subsequent innovation across various markets. Therefore, before making a judgment regarding how harmful the identified opportunistic strategies actually are to the incumbent and how significantly the entrants can benefit, more thorough and longer-term research is needed to explore relevant market dynamics and outcomes.

Second, traditionally a platform incumbent protects its platform by keeping multihoming costs high. For example, Apple’s resistance towards cross-compilers is a way to facilitate development of co-specialized non-generic complementarities (Jacobides et al., 2018; Cennamo et al., 2018). However, as Corts and Lederman (2009) note, complementor multihoming also generates cross-platform network effects that benefit all platforms involved. It thus may sometimes be in owner’s interest to lower multihoming costs. As an example, Ozalp et al. (2018) note, while the main purpose of Sony’s Tools & Middleware program aimed at game-development tool firms was to smoothen the complementors’ learning curve for Sony’s own new platform, it also allowed game development to competing platforms. Importantly, here the platform owner itself licensed the APIs for third parties, creating a business case for cross-platform dynamics. Overall, how should the cross-platform development tools, such as Microsoft’s Xamarin or Unity, that offer multi-homing across various platforms, be categorized in terms of platform competition? While they operate on top of the “host platforms” supporting their developers, these “platform type of tools” also compete with the underlying platforms not only by taking licensing fees from the complementors, but also by offering advertisements and promotion tools for them that are increasingly important in monetizing the complements. Similarly, WeChat and its mini-programs (Bianchi et al., 2000) is an example of a cross-platform approach bearing also resemblance to platform injection. We leave it to future research to study cross-platform approaches in more detail, as they showcase even more aspects of the commensalistic relationships (Aldrich and Ruef, 2011) among platform ecosystems.

Looking at our results more broadly, it is noteworthy that the classical competitive strategy literature certainly investigates the full variety of strategic moves, including resource imitation and rivalrous learning (Hamel, 1991; Teece, 1986). Nevertheless, the nature of digital resources and platform ecosystems provide a new context in which complementors and potential or current competitors might be able to access the same set of resources considerably more easily than they previously could. Importantly, providing access to the platform core or boundary resources is often a governance choice for platforms that aim to build generative ecosystems (Boudreau, 2010; Eisenmann et al., 2009; Tura et al., 2018). Therefore, the digital platform context invites researchers to revisit the classic resource similarity and market commonality in competitor and market analyses (Chen, 1996; see also Cennamo and Santaló, 2019). While the general prevalence of ecosystems has blurred industry boundaries (Iansiti and Levien, 2004; Moore, 1993), the convergence of digital technologies has contributed to additional opportunities for the direct imitation and utilization of similar resources, thereby creating direct and serious competitive implications. Competitive strategy research therefore benefits from analyzing the features of digital platforms and platform resources in terms of the implications that they allow increased resource similarity and market commonality and thus potentially lead to more rivalrous competition (Chen and Miller, 2015).

For resource-based theorizing, our study suggests that more attention should be paid to the distinct nature of digital resources (e.g., see Kallinikos et al., 2013; Yoo et al., 2010), which involve features similar to what Grant (1996) discussed as explicit knowledge and, relatedly, transferability, aggregation, and easiness of appropriability. Digital resources, characterized by homogenization (Yoo et al., 2010) rather than idiosyncrasy, strongly facilitate the aforementioned three features of information and knowledge resources. Through all these features, and from the perspective of the strategies identified in our study, we may argue that profiting from innovation is faced with new challenges in the digital world (see also Teece, 2018). Indeed, improved access to a variety of incumbents’ platform resources opens up the possibilities for some entrants to avoid costly resource investments, while for incumbents, it might hurt the possibilities of profiting from platform innovation. This dynamic demonstrates that the tension between generativity and control identified in platform markets (Yoo et al., 2012) resembles that of the “paradox of openness” faced by innovators who expose their resources (Larsson and Salter, 2014). However, in the case of digital platform resources, the paradox of openness becomes much more direct and explicit, as the exposed resources might be completely transferrable and imitable to the outsiders given that this very feature

---

13 https://unity.com/.
is the source of value creation.

Relatedly, the VRIN\textsuperscript{14} properties (Barney, 1991) of resources must indeed be reconsidered in the digital platform context. Along classical RBV thinking, platform owner may opt to either keep platform core resources proprietary (e.g., Apple iOS) or open source them and thereby forfeit their non-imitability (e.g., Google Android). However, a significant portion of a platform’s value accrues from complementary resources that are relational resources (Dyer and Singh, 1998; Lavie, 2006), not owned and only partly controlled by the platform owner, and as such are typically proprietary. The rareness and inimitability of complements may be a source of competitive advantage (as illustrated by the scarcity of apps on the Windows Phone). However, due to the transferability of digital resources and the inimitability of interfacing boundary resources (APIs), the complements, which as such are VRIN resources, may become mobile from the platform perspective via platform pacing. Regarding boundary resources, as we pointed out earlier, while interfaces are open by definition, they may nevertheless also be made VRIN (e.g., Java APIs enjoy copyright), and the platform owner can also employ other governance mechanisms that, for instance, prevent alternative marketplaces. In summary, these notions suggest that, rather than a platform’s core or complements, boundary resources—both technical (e.g., APIs) and legal (e.g., terms and conditions)—are often elemental for a platform’s competitive advantage. Competitive advantage originates in the former type from the VRIN properties of the actual resources and is determined in the latter type by how effectively these resources protect the VRIN properties of the other resources they govern.

Overall, since platform resources are both a source of advantage and a source of tension, our results call for future research that synthesizes the understanding of the layered modular architecture of digital resources (Yoo et al., 2010), IPR issues related to software, data, and APIs, literature on platform governance and boundary resources, and competition policy perspectives.

Implications for managers

Given the increasing openness and generativity of digital platforms, we expect strategic moves such as platform exploitation, injection and pacing to become more common. Chief digital officers pursuing digital transformation (see Singh et al., 2019), other managers, and entrepreneurs in charge of designing platform strategies and platform architectures should be aware of these moves in order to use them to their companies’ advantage or alternatively govern and defend their own platforms from such surprising competitive moves.

Based on our cases, opportunistic moves are viable and relevant to both small and large firms. On the one hand, a small firm such as Jolla, with the help from community, has been able to integrate with Android’s vast codebase and interfaces. On the other hand, also large firms such as Amazon and Google have benefited from exploiting resources from other platforms. Larger firms of course have the resource advantage which enables to take more risks and even face a costly litigation as Google has witnessed in its relationship with Oracle. Indeed, for new platform entrants that are firms in traditional industries looking for a digital business model, these strategies provide away to leapfrog heavy investments in digital technologies and bypassing the chicken-and-egg problem. In that sense, opportunistic approaches could be seen to as a part of newly emerging digital seizing and transforming dynamic capabilities useful for digital transformation (Warner and Wager, 2019).

There are different ways to approach opportunistic platform strategies, and not all of them are equally prone to conflict among platform ecosystems. On the other hand, with existing ecosystem of users and developers in place, entering the markets with own offering might be a good choice, especially if a way to differentiate are available. In some cases, the rivalry of incumbent platforms might be a matter of targeting distinct user groups (e.g., B2B rather than B2C) or entering into geographical markets in which incumbents do not currently operate (e.g., Xiaomi in China). On the other hand, rivaling incumbent platforms on their home turfs (e.g., Amazon Fire) might instigate countermoves, changes in platform architecture and regulation, or even legal battles. However, it is important to note that while these opportunistic moves are competitive it does not mean they are always illegal. Even in the afore mentioned Oracle v. Google litigation, it is still to be conclusively decided whether Google acted illegally.

Our theorization also sheds light on the recent Huawei saga\textsuperscript{15}, in which the US government has prohibited Google from licensing its services (e.g., Google Maps, Google Play, and Google Play Services) to Huawei. Should this ban remain in effect—as appears to be the case—and not only a threat used in the trade war, our study suggests that rather than pursuing a traditional head-to-head approach—which seems to be the case according to the recent announcement of HarmonyOS\textsuperscript{16}—Huawei would benefit from pursuing opportunistic strategies. Importantly, it would not be sufficient for Huawei to replicate Google Play, but similarly to Amazon Fire, it must also apply platform pacing to replicate Android APIs, including Google Maps APIs and their backend.

A key question regarding incumbent platforms is how they should govern and defend against strategies such as platform exploitation, injection, and pacing. Early design choices concerning platform openness and accessibility to complementors (Boudreau, 2010; Eisenmann et al., 2009; Tura et al., 2018) often regulate how accessible a platform is to opportunistic strategic moves. Therefore, incumbents often encounter difficulty in defending against such moves, which might require exertion of excessive control and thereby sacrifice the generativity of their own ecosystems. On the other hand, the decisions regarding openness can also be temporal, wherein platform content is regulated by temporary IPRs (Parker and Van Alstyne, 2017). Finding a balance between control and generativity is indeed a key aspect in facilitating platform innovation (Yoo et al., 2012), and sometimes it might be best to retain the open approach.

\textsuperscript{14} VRIN = valuable, rare, inimitable, non-substitutable.


15
and allow for opportunistic entrants to also capture value, possibly reaping generative appropriability in the future (Ahuja et al., 2013). This strategy would follow the logic of “coopetition,” in which allowing competitors to win is acceptable as long as the incumbent firm also generates profits (Nalebuff and Brandenburger, 1996). On the other hand, some platform businesses have been able to build upon coopetition principles in growing their businesses while maintaining control of their platform-related transactions, as exemplified by the Amazon Marketplace case (see Ritala et al., 2014).

On a technical level, platform leaders can utilize boundary resources (Ghazawneh and Henfridsson, 2013) to further regulate access to the platform core and complements. Here, important decisions include the contractual clauses in terms and conditions as well as design of APIs, SDKs, and other boundary resources. Regarding pacing, a key element in prevention is to block complements from being distributed in marketplaces outside one’s own platform ecosystem. For example, rather than allowing third-party marketplaces in its developer terms and conditions, Google could confine its app distribution exclusively to Google Play and the certified app stores of its OHA partners.

The importance of controlling distribution and the quality of complements is reminiscent of the video game industry’s crash in 1983 (see e.g., Gallagher and Park, 2002). Activision, a complementor of the Atari platform, enabled “cartridge pacing” and managed to negotiate favorable licensing fees from Atari. This triggered competing platforms (e.g., ColecoVision and Intellivision) to pace Atari’s boundary resources (via approaches such as System Changer) and eventually, after Atari lost control, the market was flooded with low-quality games. Combined with the simultaneous rise of personal home computers that somewhat “enveloped” the consoles, the market collapsed, and Atari declared bankruptcy.

Conclusion

In this study, we have established a logic for how three types of opportunistic strategies allow entrant platforms to capture value by using resources and complements accessible in incumbent platform ecosystems. These moves are increasingly available due to the openness of platform governance that aims to spur complementor innovation and the resulting easily exploitable and imitable nature of digital platform resources, including platform core and boundary resources. Strategies of platform exploitation, platform pacing, platform injection, and their combinations enable entrant platforms to leapfrog up-front resource investments and solve the chicken-and-egg problem when entering the market despite facing unfavorable winner-take-all dynamics. Understanding how such strategies create and capture value is specifically important for entrants and incumbents that operate in fields wherein generativity, open platform architectures, and complementor innovation play key roles. Our study provides a first analytical effort to analyze the variety of these strategies and thereby unfolds an interesting line of inquiry for further research on the topic.

Funding

This work has been supported by the project Digital Disruption of Industry funded by the Strategic Research Council (Grant number: 292889) of Finland.

CRediT authorship contribution statement

Kimmo Karhu: Conceptualization, Methodology, Investigation, Writing - original draft, Visualization. Paavo Ritala: Conceptualization, Methodology, Writing - review & editing, Visualization.

Acknowledgements

We sincerely thank the editors and three anonymous reviewers for their constructive and highly useful comments that significantly helped to improve the paper and crystallize the contribution. Further, we want to also thank Pontus Huotari, Ekaterina Albats, Anne Quarshie, and Robin Gustafsson for their supportive and helpful comments on the early versions of the manuscript.

Appendix A. Supplementary data

https://doi.org/10.1016/j.lrp.2020.101988

References


Kimmo Karhu, D.Sc., currently works as a Head of Data at City of Helsinki. Kimmo is also affiliated with and previously held a Postdoctoral Researcher position in the Department of Computer Science at the Aalto University. His doctoral thesis analyses open platform strategizing and digital tactics in mobile ecosystems. Kimmo’s research interests include both information systems and strategic management issues such as digitalization and platform strategies. His research has been published in journals such as Information Systems Research and Telematics and Informatics.

Paavo Ritala, D.Sc. (Econ. & Bus. Adm.), is a Professor of Strategy and Innovation at the School of Business and Management at Lappeenranta University of Technology (LUT). His main research themes include collaborative innovation, knowledge sharing and protection, coopetition, platforms and ecosystems, as well as sustainable value creation. His research has been published in journals such as Research Policy, Journal of Product Innovation Management, Industrial and Corporate Change, Technovation, and British Journal of Management. He is also closely involved with business practice through company-funded research projects, executive and professional education programs, and in speaker and advisory roles.