

# CPRC Discussion Paper Series

## Competition Policy Research Center

Japan Fair Trade Commission

Preface: The formation and expansion of ecosystems by digital platform companies

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CPDP-89-1-E January 2023

(This paper was originally written in Japanese in December 2022 (CPDP-89-1-J))

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# **Preface: The formation and expansion of ecosystems by digital platform companies**

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## **Abstract**

We review the concept of ecosystems in the context of management and of competition law. Then, we address the articles on platform ecosystems in the discussion paper series published by the Competition Policy Research Center at the Japan Fair Trade Commission.

## 1. Introduction

Concerns have emerged about influential digital platform companies aggressively entering new markets that complement the activities in their main business domains, to expand these domains through positive network externalities in these new markets and to strengthen their market positions by expanding their business networks, the so-called “ecosystems”, which generate mutual positive feedback externalities (e.g., Jacobides and Lianos, 2021). These influential digital platform companies use complementarities between markets to achieve economies of scale and scope and to provide positive network effects to users in their markets through multiple pricing strategies (e.g., bundling and personalized offers), making it easier for them to maintain their dominant position (Fletcher, 2020).

When influential digital platform companies form ecosystems connecting many markets, the competition authority encounters difficulties in enforcing competition law. For instance, if these companies cause negative effects on competition through exclusion, exploitation, or mergers, it might be infeasible for the competition authority to undertake traditional measures such as defining markets to evaluate the effects of such conduct.<sup>1</sup> Moreover, in some cases, it is difficult to identify substitutability between the services of such companies and competing services because of mutual interactions within and between ecosystems to which companies belong.<sup>2</sup> Thus, the competition authority must understand the mutual interactions within and between ecosystems and the effects of platform firms’ problematic conduct on competition in order to implement appropriate policy.

Theoretical and empirical rationales are required to analyze competition within platform ecosystems; in particular, there are few such analyses for Japan. First, we review the theoretical research on competition among digital platforms. Second, we consider the empirical methods available to evaluate the negative impacts of anticompetitive behavior.

This paper proceeds as follows. Section 2 defines ecosystems by reviewing the

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<sup>1</sup> Madiaga (2020, p. 3) points out the following types of exclusion and exploitation: “self-preferencing, i.e., unfairly favouring own products and services to the detriment of competing businesses; preferencing of a third party, i.e. unfairly favouring a third party’s products or services to the detriment of competing businesses; unjustified denial of access to the platform or functionalities necessary to conduct business; unjustified denial of access to collected data; imposition of exclusionary terms and conditions for access; unjustified tying and bundling practices, i.e. selling or offering together distinct goods/services without proper justification, imposing unclear or unreasonable terms and conditions on business users or on end-users, unduly restricting or refusing data portability, i.e. impeding individuals from obtaining and reusing their personal data for their own purposes across different services, effectively locking end-users into one platform; and also unduly restricting or refusing interoperability making it very difficult or impossible for businesses and end-users to switch platforms.”

<sup>2</sup> Crane (2019, pp. 2–3) provides the following three examples of competing products or services within firms that do not offer substitutable products or services: middleware and operating systems (Microsoft vs Netscape); e-books and tablets (Apple vs Amazon); connected and automated vehicles (not only car manufacturers but also ride-sharing services such as Uber and Lyft and technology companies such as Google).

literature, and mainly that relating to management research. Section 3 discusses ecosystems in the context of competition law and describes several key characteristics of ecosystems. Section 4 reviews three papers on platform ecosystems: Kittaka, Sato, and Zennyo (2022), Kawaguchi, Kuroda, and Sato (2022), and Nakagawa and Matsushima (2022).

## **2. Ecosystems**

Moore (1993) is among the first to use the term “ecosystems” in the context of business management, although recently this term has been used more frequently following the growth of digital platform companies. Referring to the discussion on natural ecosystems by the biologist Stephen Jay Gould, Moore (1993, p. 76) claims that Gould’s discussion is useful to derive insightful managerial implications because of the similarity between management environments that require innovative changes and natural ecosystems. Based on this claim, he suggests that “a company be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries.”

Based on Moore (1993), Iansiti and Levien (2004a) conceptualize the roles of stakeholders within ecosystems and seem to define ecosystems as business environments consisting of various economic agents, including trading partners, capital providers, technology licensors, companies jointly providing complementary products, competitors, and customers. Firms regarded as keystones play important roles within ecosystems and can have competitive advantages. For instance, they point out that Walmart’s procurement system and Microsoft’s Windows OS are the keystones in their market environments. Maintaining the roles of keystones is an important strategy that benefits the economic agents within the ecosystems.

While authors use the term “ecosystems” in various ways (Iansiti and Levien, 2004b; Adner and Kapoor, 2010), Adner (2017) classifies ecosystems into “ecosystems as affiliation” and “ecosystems as structure” and recommends using the latter. Articles based on the former include Moore (1993, 1996) and Iansiti and Levien (2004a,b), which define ecosystems as places that link many loosely tied participants. Adner (2017) defines ecosystems from the perspective of structuralism as follows: “The ecosystem is defined by the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize” (Adner, 2017, p. 43). He also defines ecosystem strategy as follows: “Ecosystem strategy is defined by the way in which a focal firm approaches the alignment of partners and secures its role in a competitive ecosystem” (Adner, 2017, p. 47).

Jacobides et al. (2019) discuss how and why ecosystems emerge, and then clarify the

difference between ecosystems and other governance structures by briefly referring to platform ecosystems.<sup>3</sup> They point out that ecosystems support coordination between interrelated organizations with strong independencies, which is the important feature of ecosystems that was ignored in the literature. They claim that such coordination becomes feasible through a “modular architecture,” which involves situations where the sum of the individualized elements constitutes the entire structure (Baldwin and Clark, 2000). Furthermore, they mention that platform ecosystems can be viewed as “semi-regulated marketplaces” that promote entrepreneurial behavior under the coordination and control by platform supporters or “multisided markets” which enables varieties of transactions between different user groups (Jacobides et al., 2019, p. 2258).

Furthermore, Jacobides et al. (2019) focus on complementarity, one of the key elements of ecosystems. They classify complementarity into “unique complementarities” and “supermodularity.” The former concept captures the indispensability of one product in order to use another product. The latter is mutual value augmentation, in which an increase in the volume of an item increases the value of another item and the other way around. Given these two types of complementarities, they define ecosystems as follows: “an ecosystem is a set of actors with varying degrees of multilateral, non-generic complementarities that are not fully hierarchically controlled” (Jacobides et al., 2019, p. 2264). Furthermore, they recommend that if at least one of the two types of complementarities mentioned above occurs in both consumption and production, we should use the concept of ecosystems (see Figure 2 in Jacobides et al. (2019, p. 2266)).

### **3. Ecosystems and Competition Law**

Moore (2006) is an earlier work that applies the concept of ecosystems to competition law. By combining his earlier discussion in Moore (1993) with competition policy, Moore (2006) emphasizes the importance of technological revolution and investment that support such a revolution. Moore (2006) also emphasizes that “[t]he purpose of a business ecosystem is not only to deliver today’s solutions, but to deliver tomorrow’s innovations” (Moore, 2006, p. 69); therefore, he states that “the most egregious overcharges are those that deny innovation to customers” (Moore, 2006, p. 69) and “[i]ncumbents argue that these margins are justified, because they are only maintained by massive forward investments in research and development and new operating capacity” (Moore, 2006, p.

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<sup>3</sup> Jacobides et al. (2020) mention that platforms and ecosystems are different concepts. They summarize those concepts, the elements of each concept, and the interdependencies of those elements in each concept. Furthermore, following the recent trend to clearly define ecosystems, Jacobides et al. (2020, Table 1) summarize the definitions of ecosystems, the analytical elements of focus, representative examples, and the relationship between ecosystems and platforms in the relevant literature since Adner (2017).

70).

Petit and Teece (2021) provide the argument, which is similar to that of Moore (2006), that big tech firms are in dynamic competition with innovation and threat of new entry, implying that using static models to analyze monopolistic behavior is useless and does not provide any useful implications. They suggest the effectiveness of characterizing competitive environments by product characteristics and time horizons (Petit and Teece, 2021, p. 1191) and emphasize the importance of recognizing potential competition.

Jacobides and Lianos (2021) review how previous papers that examine the scope of competition law define ecosystems. They identify new challenges for competition policy, which stem from competition in an ecosystem of complementary products (Jacobides and Lianos, 2021, p. 1200). Considering optimistic attitudes towards both interecosystem and intraecosystem competition issues (e.g., Petit and Teece, 2021), Jacobides and Lianos (2021) introduce policy options (e.g., Crémer et al., 2021) that are different from those optimistic views and caution that potential competition does not always function well because incumbent firms can adopt anticompetitive conduct (e.g., locking in final consumers) that impedes long-term competition.

Caffarra et al. (2020) emphasize the importance of understanding ecosystems and business models in competition policy.<sup>4</sup> They mention that we can understand the effects of various behaviors motivated by monetization on competition and social welfare by detecting the key revenue sources of the pivotal firms in ecosystems and effective strategies to enlarge those revenue sources. They explain the importance of understanding the key revenue sources in ecosystems by introducing examples: investments of firms that depend on consumer sales differ from those of firms that depend on ad-sponsored services; competitive environments change if a pivotal firm in its ecosystem launches a new activity that complements its primary revenue sources.

From the above discussions, we can conclude that understanding ecosystems managed by big tech firms is indispensable to implementing competition policy.

#### **4. Three papers on platform ecosystems in the discussion paper series**

The Competition Policy Research Center (CPRC) invites Japanese specialists on platform ecosystems to submit papers for publication in the discussion paper series. Assistant Professor Yuta Kittaka, Assistant Professor Susumu Sato, and Professor Yusuke Zenny write a review paper (Kittaka et al., 2022) on self-preferencing by platform companies following the recent trend of intermediary platform companies supplying

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<sup>4</sup> Recent papers on ecosystems managed by platform firms are, for instance, Etro (2021a), Teh (2022), and Zenny (2021).

independent firms' products, but also their own products, to which they grant preferential treatment on their platforms. Assistant Professor Kohei Kawaguchi, Associate Professor Toshifumi Kuroda, and Assistant Professor Susumu Sato propose a useful method in their paper (Kawaguchi et al., 2022b) of evaluating market definitions and market power in mobile application economies by reviewing the antitrust cases related the said economies. Finally, in Nakagawa and Matsushima (2022), Professor Akihiko Nakagawa and Professor Noriaki Matsushima discuss conglomerate mergers by considering the Google/Fitbit merger case and a recent theoretical analysis on the cross-market effects of data-driven mergers (Chen et al., 2022).

#### **4.1 Kittaka et al. (2022)**

Considering that intermediary platform companies provide products and services in various industries such as search engines, online shopping malls, and game consoles, Kittaka et al. (2022) define such platform companies acting not only as an intermediary but also as sellers as “dual-role platforms,” and review the literature on self-preferencing by dual-role platforms.

Kittaka et al. (2022) refer to many papers on self-preferencing by dual-role platforms. They first mention three papers by Andrei Hagiu (Hagiu and Spulber, 2013; Hagiu and Wright, 2015; Hagiu et al., 2020) which examine managerial rationales to act as dual-role platforms. One rationale for being a dual-role platform is creating optimistic expectations for product demands on intermediary platforms (Hagiu and Spulber, 2013). The second is the possibility that platform companies prefer to be resellers on their platforms under certain market conditions (e.g., information variances; network externalities) (Hagiu and Wright, 2015). The third is changing the competitive environment by a seller that launches its intermediary platform, which is also available for competing sellers (Hagiu et al., 2020).

Although Kittaka et al. (2022) review both theoretical and empirical papers on dual-roles platforms, the theoretical papers referred in their paper are those by Etro (2021b), Shopova (2021), and Anderson and Bedre-Defolie (2022).<sup>5</sup> The key issues in these papers are (percentage) commission fees charged to independent sellers and whether those fees increase by introducing their own products on the platforms. Because the effect of such product introductions on commission fees and welfare depends on several factors, including the price elasticity of demand and product characteristics, Kittaka et al. (2022) emphasize the importance of obtaining accurate information about market structures to evaluate the effect on welfare.

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<sup>5</sup> Zhu (2019) is an excellent survey on related empirical papers.



Kittaka et al. (2022) cover three types of self-preferencing: (i) manipulation of search results on search engines; (ii) manipulation of search results and rankings on marketplaces; (iii) usage of data on independent sellers' transactions. They particularly focus on a seminal paper by Hagiu et al. (2022) and papers that explicitly incorporate consumer search behaviors on marketplaces (Kittaka and Sato, 2022; Zenny, 2022). Hagiu et al. (2022) discuss a situation in which an independent seller needs a sales achievement made in a monopolistic platform/marketplace to inform the existence of its product to consumers, and in which the monopolistic platform can hide the independent seller. Kittaka and Sato (2022) consider a situation in which consumers always see the platform firm's own product in an initial search result. Zenny (2022) considers a situation in which search results always display a platform firm's own products. The effects of self-preferencing on welfare in these research papers depend on the type of manipulation.

#### **4.2 Kawaguchi, Kuroda, and Sato (2022b)**

Kawaguchi, Kuroda, and Sato (2022b) consider the methods to define a market and to estimate the market power of firms, including influential platform companies, in the "mobile app economy" (the economy concerning mobile devices such as smartphones and tablets and the usage of mobile applications for those mobile devices).

First, they summarize the components of the mobile app economy and then mention that Apple and Google, influential platform companies, engage in many of those components, which include mobile devices, mobile OSs, mobile apps, mobile app distribution services, and mobile app monetization services. Apple is a major player in the mobile device market, but Google is not; with regard to the mobile app market, besides Apple and Google, more than 100,000 app developers have entered the market; Apple and Google have in total more than a 90% market share in the mobile app distribution service market; Apple and Google are duopolists in payment services in the mobile app monetization service market; Google and several independent firms engage in advertising services in the mobile app monetization service market. In summary, Apple and Google dominate the markets of the key components that directly contribute to monetization.

Considering the engagement by Apple and Google with many components in the mobile app economy, they are (vertically) integrated firms and actively control the economy's structure. For instance, Apple and Google set the terms of their mobile app distribution services that obligate the developers of applications for those distribution services to use their mobile app monetization services. Kawaguchi, Kuroda, and Sato (2022b) also discuss antitrust cases in which market definitions influence the evaluations of the dominant firms' market power.

Second, following the summary of the mobile app economy, Kawaguchi, Kuroda, and Sato (2022b) theoretically consider the market definition and the evaluation of market power. In the main discussion, they assume that consumers choose one of the two OSs as their own OS (single-homing) and the developers of applications are more likely to supply to both OSs (multi-homing). They mention that switching by consumers from Apple iOS to another OS is more difficult than switching to it, and that applications within an OS compete with other substitutable applications not only within the same OS but also outside the same OS. They also mention that some applications can influence consumers' choices of OSs depending on an app's characteristics (e.g., apps that have high spillover effects to the whole OS). From the viewpoints of app developers, OS substitutability in mobile app monetization services is critical because it influences app developers' incentive to monetize and those developers' business models (Gans, 2012; Zenny, 2021; Kawaguchi et al., 2022a). In addition, although app developers have ad revenues as a way of monetization, the gains for consumers and advertisers from advertising often do not go together, making the welfare evaluation of advertising difficult.

Finally, following the method in Kawaguchi, Kuroda, and Sato (2022a), Kawaguchi, Kuroda, and Sato (2022b) present a tractable method to define a market and evaluate market power. They classify the degree of competition in the advertising market into perfect competition and imperfect competition and construct prediction models of consumer choice in the two competitive modes. Based on the models, they explain how to define a market by applying a hypothetical monopolist test and how to estimate important indicators (e.g., elasticity, conversion ratio). The novel methods explained here are useful competition policy tools and are expected to be used widely.

### **4.3 Nakagawa and Matsushima (2022)**

Nakagawa and Matsushima (2022) refer to the overview of the Google/Fitbit merger and the related theory by Chen et al. (2022) to discuss conglomerate mergers from the viewpoint of Japanese competition law.

First, they present a summary of the merger review of the Google/Fitbit case by the Japan Fair Trade Commission. The review considers not only the effect of the conglomerate merger on competition but also the possibility of market foreclosure through Google's market power in the OS market and the standard exclusion effect of vertical integration. However, they mention that the review did not intensively consider the effect of the conglomerate merger because the potential problems of the conglomerate merger are yet to arise.

Next, they explain the key points in Chen et al. (2022) graphically. The graphical explanation captures competition in two independent markets in which a merged firm that

enters the two markets competes with each independent firm. The roles in the markets are data application (digital health care) and data collection (wearable devices). The merged firm can offer personalized products at personalized prices to more consumers in the data application market if it has a large market share in the data collection market. In the market environment, the greater the benefit of personalized products through data application is, the larger the market shares of the merged firm become, leading to monopolization if the personalized benefits are significant.

Finally, based on the Google/Fitbit case and the findings of Chen et al. (2022), Nakagawa and Matsushima (2022) consider conglomerate mergers from the viewpoint of Japanese competition law. They first summarize the key findings of Chen et al. (2022) and its shortcomings. Then, they consider the paper's implications for merger policy. Finally, there needs to be more discussion regarding competition policy from the viewpoints of both competition law and economics in Japan.

We hope that the discussion paper series contributes to understanding platform ecosystems.

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