

Mapping the landscape: unveiling the structural dynamics of industry platforms

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Abstract

Purpose – The proliferation of industry platforms has disrupted several industries. Firms adopting a platform business model have experienced a substantial expansion in size and scale, positioning themselves as the foremost valuable entities in market capitalization. Over the past two decades, there has been a substantial expansion in the body of literature dedicated to platforms, and different streams of research have emerged. Despite considerable efforts and the significant progress made in recent years toward a comprehensive understanding of industry platforms, there is still room for further harnessing the field's diversity. As a result, the aim of this article is to examine the field's structure, identify research concerns and provide suggestions for future research, thereby enhancing the overall understanding of industry platforms.

Design/methodology/approach – We conducted a thorough examination of 458 articles on the topic using bibliometric methods and systematic review techniques.

Findings – Through co-citation analysis, we identified five distinct clusters rooted in various bodies of literature: two-sided markets, industry platforms, digital platforms, innovation platforms and two-sided networks. Furthermore, the examination of these five clusters has revealed three key areas that demand further consideration: (1) terminologies, (2) classifications and (3) perspectives.

Originality/value – While previous reviews have provided valuable insights into the topic of industry platforms, none have explored the structure of the field so far. Consequently, as a first step toward advancing the field, we uncover the structure of the literature, identifying three major areas of concern. By addressing these concerns, our goal is to converge different clusters, thereby harnessing the diversity in the field and enhancing the overall understanding of industry platforms.

Keywords Two-sided markets, Industry platforms, Digital platforms, Innovation platforms, Two-sided networks, Network effects, Literature review, Business models & strategy

Paper type Literature review

1. Introduction

The proliferation of industry platforms has disrupted several conventional businesses operating in different industries, such as transportation (Uber), software development (Apple iOS) and hospitality (AirBnB). Platform businesses nowadays rank among the most valuable



entities in relation to market capitalization, e.g. Alphabet, Microsoft and Amazon. Industry platforms are defined as “products, services, or technologies developed by one or more firms, and which serve as foundations upon which a larger number of firms can build further complementary innovations and potentially generate network effects” (Gawer and Cusumano, 2014, p. 420). Over the last two decades, academic scholars have extensively explored various facets of platforms. Some have immersed themselves in the intricacies of platform competition (e.g. Rochet and Tirole, 2003; Armstrong, 2006; Rysman, 2009). Others have synthesized insights from economics and engineering design literature, aiming to bridge these domains and propel the field of strategic management research forward (e.g. Gawer, 2014; Gawer and Cusumano, 2014). Other scholars have conducted in-depth investigations into platform governance (such as Ghazawneh and Henfridsson, 2013; Eaton *et al.*, 2015; Lin *et al.*, 2022; Zhang *et al.*, 2022), initially emphasizing hard governance mechanisms (e.g. Ghazawneh and Henfridsson, 2015) and gradually transitioning to more nuanced, soft governance approaches (e.g. Foerderer *et al.*, 2021). Lastly, some scholars have focused on the dynamic interplay between innovation and competition, opening avenues for exploration into novel topics that were previously unexplored (e.g. Boudreau, 2010; Eisenmann *et al.*, 2011).

Despite significant efforts and the substantial progress made in recent years to understand platforms and their ecosystems comprehensively, there is still room to advance the harnessing of diversity within the field further, as the current picture is still missing many puzzle pieces. For instance, obtaining an economic perspective that delves into the topic of platform boundaries and breaking “the atomistic view on platforms” (Gawer, 2021, p. 2) would be highly beneficial. Besides, the current understanding not only lacks significant pieces of the puzzle but also overlooks nuanced, yet critical, aspects. For instance, there remains uncertainty regarding what qualifies as a digital platform and what is not, despite the distinction made by de Reuver *et al.* (2018). Similarly, the classification of innovation platforms lacks consensus and a unified definition, given the different perspectives presented by Baldwin and von Hippel (2011) and Gawer (2021). Further, ambiguity persists concerning the various classifications of platform business models, with each classification, such as those by Evans and Schmalensee (2008), Ghazawneh and Henfridsson (2015) or Cusumano *et al.* (2019), presenting its own distinct categories. Consequently, the evolution of these platforms over time remains unclear, with scholars proposing different trajectories based on the diverse classifications of these platforms. In brief, our comprehensive understanding of industry platforms still contains notable gaps, leaving ample opportunity for the advancement of the literature to more advanced stages.

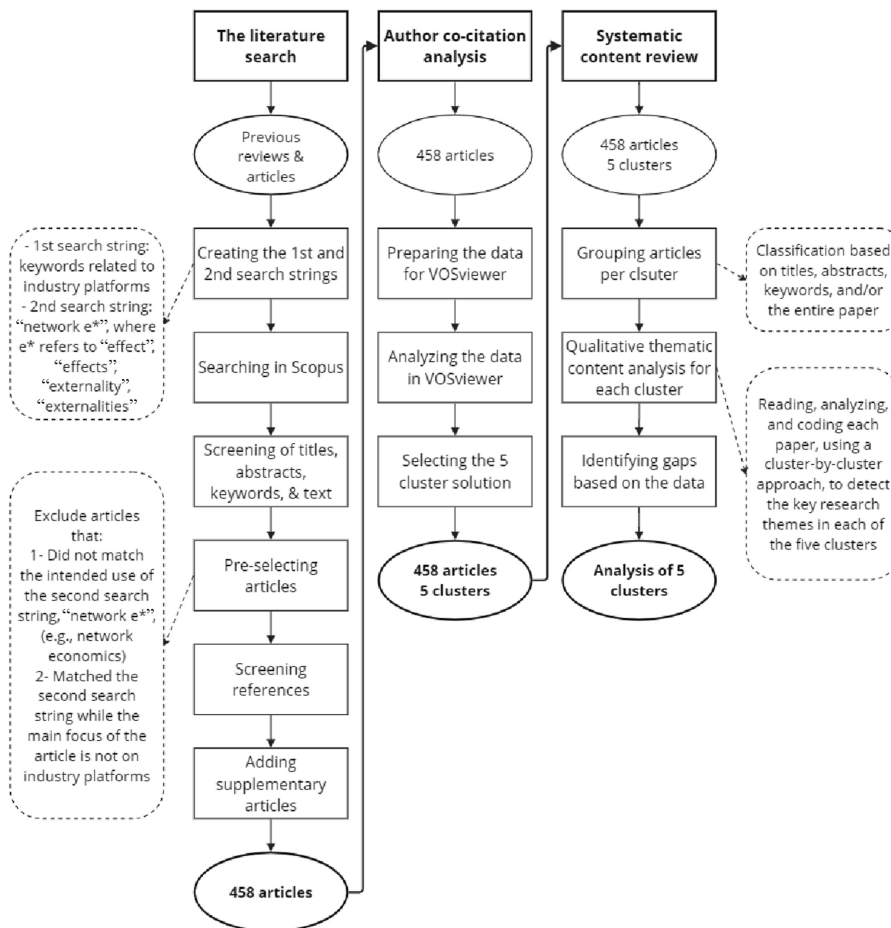
As an initial step toward the goal of elevating the harnessing of the field to a more advanced level, we consider it crucial to grasp the underlying structure of the domain. Hence, we undertook a comprehensive analysis of 458 articles, employing bibliometric methods and systematic review techniques (Kraus *et al.*, 2022, 2024; Sauer and Seuring, 2023). The current study adds significant value by uncovering the literature’s underlying structure, identifying key research concerns and providing suggestions for future research. Using co-citation analysis, we have identified five distinct clusters grounded in various bodies of literature: two-sided markets, industry platforms, digital platforms, innovation platforms and two-sided networks. Additionally, our analysis of these five clusters has unveiled three primary critical areas requiring further consideration: (1) terminologies: distinct clusters not only employ varying terms for the same phenomena but also introduce inconsistent terminologies; (2) classifications: akin to terminologies, different clusters present divergent classifications for the same phenomena; and (3) perspectives: the predominant focus across clusters has been on examining platforms from the perspective of the platform owner, neglecting the fact that the owner is just one of four major players within the ecosystem (Van Alstyne *et al.*, 2016a). By addressing these concerns, we aim to advance the harnessing of this diverse literature, contributing to its enrichment within and across different clusters and enhancing the overall understanding of industry platforms.

2. Methodology

As a first step toward conducting a systematic literature review, we began by selecting keywords to help us identify articles potentially relevant to the field of industry platforms. Next, we searched for the chosen keywords in peer-reviewed scholarly articles (Tranfield *et al.*, 2003; Zupic and Čater, 2015), both published and “in press,” using Elsevier’s Scopus database, which is commonly recognized as the most effective tool for conducting literature searches (Falagas *et al.*, 2008). The term “platform” is a very broad term, and a search using it generates thousands of scholarly articles that are distant from our scope of work. Therefore, we had to select our keywords meticulously to ensure a specific focus on industry platforms. We aimed to choose articles that contained one of the following keywords in the title, abstract or keywords (Newbert, 2007): “tech* platform*” or “external platform*” or “industry platform*” or “transaction platform*” or “innovation platform*” or “hybrid platform*” or “digital platform*” or “software platform*” or “software based platform*” or “software-based platform*” or “internet platform*” or “two sided market*” or “two-sided market*” or “twosided market*” or “two sided platform*” or “two-sided platform*” or “twosided platform*” or “platform logic” or “platform competition” or “platform evolution” or “platform governance” or “platform leader*” or “platform ecosystem*” or “platform based ecosystem*” or “platform-based ecosystem*” or “multi sided market*” or “multi-sided market*” or “multisided market*” or “multi sided platform*” or “multi-sided platform*” or “multisided platform*”. However, to focus solely on industry platforms, and because an industry platform is distinct from an internal, company, product or supply-chain platform due to its ability to generate network effects (Gawer and Cusumano, 2014), we included a second search string that required the selected articles to include “network e*” in their full text. This phrase, “network e*”, refers to “network effect,” “network effects,” “network externality” or “network externalities.” This search strategy, “network e*”, was validated against the search results using the keywords “network effect,” “network effects,” “network externality” or “network externalities.”

The Scopus search generated 446 articles, and after an initial screening of the titles, abstracts and keywords, we excluded articles that (1) do not match the intended use of the second search string, which includes words such as “network economics,” for instance, and those that (2) match the second search string but the major focus of the paper is not on industry platforms. Besides, after reviewing the reference lists of the selected articles, we identified additional articles not included in our initial set. Consequently, based on the reference lists of the initial set, we incorporated the supplementary articles. Therefore, we were left with 458 articles to structure the field.

This study utilized author co-citation analysis, a method introduced in 1981 and considered a key approach in the context of bibliometric research (Jeong *et al.*, 2014). Author co-citation analysis identifies, traces and visualizes the structure of a particular academic field by aggregating the occurrence of co-citations within a specific body of literature. It involves the co-citation of one author’s publications with those of another within the reference sections of citing documents (Bayer *et al.*, 1990). Thus, author co-citation analysis aids in classifying authors who discuss roughly similar or consistent concepts (Zupic and Čater, 2015). In addition, author co-citation analysis assists in uncovering the intellectual structure of a scientific knowledge domain (see, e.g. Acedo *et al.*, 2006; Jeong *et al.*, 2014) while excluding the expert subjectivity, which is typically embedded in conventional literature reviews (Acedo *et al.*, 2006; Di Stefano *et al.*, 2010; Zupic and Čater, 2015). To conduct an author co-citation analysis and establish a preliminary structure for the examined field (see, e.g. Nerur *et al.*, 2008), we used VOSviewer Software (Waltman *et al.*, 2010). However, we were also aware of alternative textual analysis methods, such as Leximancer (Wilden *et al.*, 2016). Consequently, the bibliometric analysis was executed based on the 458 articles, which was then followed by a systematic review to clarify the structure of the field, examine each cluster, identify research concerns and provide suggestions for future research (Zupic and Čater, 2015).



Source(s): Own elaboration

Figure 1. Review process

Once the clusters were identified using the author co-citation analysis, we categorized each article into the corresponding cluster based on its title, abstract, keywords and/or the entire paper. The process was executed by the first author and then double-checked by the two co-authors. Besides, no significant conflicts arose during the classification process, as we ensured familiarity with the various clusters before commencing. As a next step, we read, analyzed and coded each paper, using a cluster-by-cluster approach, to detect the findings and key themes of the clusters. The review methodology is depicted in Figure 1, while Table 1 provides the classification of the various clusters and summarizes the key points in each.

3. Mapping the structure of the field

Based on the central themes and the terminologies adopted in each of the five clusters, we labeled the clusters as follows: two-sided markets, industry platforms, digital platforms, innovation platforms and two-sided networks. The literature on industry platforms has

significantly expanded over the past two decades, as depicted in Figure 2, which clearly illustrates the increasing number of publications since the early 2000s.

Figure 3 delves deeper into the mapping of the five distinct clusters. In Figure 3, different colors indicate cluster membership, the size of the circle describes the number of citations the authors have received, and the distances between the circles reflect the frequency of co-citation. For example, Parker is cited more than 500 times and is often co-cited with Van Alstyne, whereas he is not cited as often with Eisenmann. Therefore, in Figure 3, Parker and Van Alstyne are close in terms of the distance between their circles, whereas Parker and Eisenmann are more distant.

3.1 Two-sided markets

The origins of the literature on two-sided markets are often traced back to the economics of network externalities and strategic discussions on the chicken-and-egg dilemma. A

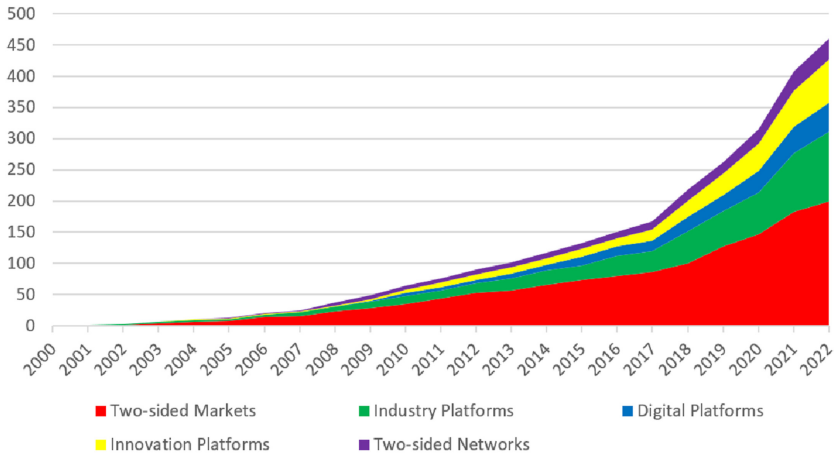


Figure 2. Number of articles per cluster

Source(s): Own elaboration

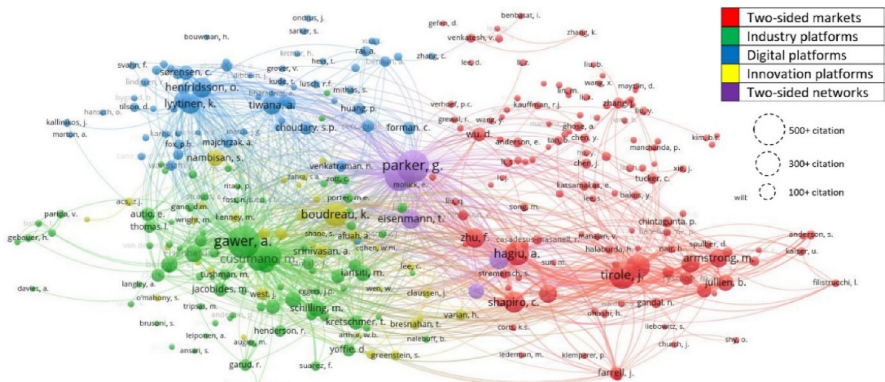


Figure 3. The five main clusters

Source(s): Own elaboration

fundamental challenge in this context is the platform's capacity to attract diverse actors and foster interactions between them, as exemplified by the relationship between advertisers and users. However, this leads to the chicken-and-egg dilemma, or which side should the platform attract first? Despite significant theoretical advancements in the economics of network externalities and discussions on the chicken-and-egg problem by scholars like [Katz and Shapiro \(1985\)](#) and [Caillaud and Jullien \(2001, 2003\)](#), limited attention was given to two-sided markets until the early 2000s. [Evans \(2003\)](#) recognized two-sided markets by identifying cross-network externalities among different participant groups. [Rochet and Tirole \(2006\)](#) expanded this definition, stating that a two-sided market is characterized by transaction volumes between end-users influenced by the market structure rather than merely the overall fees charged by the platform. However, both [Rysman \(2009\)](#) and [Hagiu and Wright \(2015\)](#) noted limitations in these definitions. In response, [Hagiu \(2014\)](#) proposed two key features as indispensable: the facilitation of direct interactions among two or more autonomous sides and the affiliation of each side with the platform.

Later, the literature on two-sided markets began to shift its focus from price dimensions to non-price dimensions ([Correia-da-Silva et al., 2019](#); [Calvano and Polo, 2021](#)). One of the initial deviations was presented by [Hagiu \(2007\)](#) who compared two contrasting strategies for market intermediation: two-sided platforms, where affiliated sellers directly sell to buyers, and the merchant mode, involving the firm purchasing from sellers and selling to buyers. More recently, [Hagiu and Wright \(2015\)](#) focused on the economic tradeoffs a firm faces when positioning itself either nearer or more distant from a multi-sided platform business model. They compared this approach to other alternatives, namely, vertically integrated firms, e.g. Sony PlayStation vs Atari ([Hagiu and Wright, 2018](#)), and resellers, e.g. eBay vs pure resellers ([Hagiu and Wright, 2015](#)). Further, [Hagiu et al. \(2022\)](#) delved into the question of whether platforms are permitted to sell on their own marketplaces. While various studies have begun to emphasize non-price dimensions, this does not imply a complete shift away from price dimensions, examples include [Gerlach and Li \(2021\)](#) and [Wu et al. \(2022\)](#), among others.

The majority of the current work in the two-sided markets cluster is, to a certain extent, theoretical and operationalized with stylized analytic models. During the early 2000s, two-sided markets were studied in various contexts, including limited industries such as payment cards, advertising-supported media, operating systems and shopping malls. The literature primarily focused on pricing policies ([Rochet and Tirole, 2003, 2006](#); [Kaiser and Wright, 2006](#)), network externalities ([Caillaud and Jullien, 2003](#); [Armstrong, 2006](#)) and competition ([Armstrong and Wright, 2007](#)). Despite some existing empirical research in the field, it remains relatively nascent ([Sriram et al., 2015](#)). One of the first empirical studies assessing network effects in a two-sided context was conducted by [Rysman \(2004\)](#), who examined the importance of network effects in the Yellow Pages market. Additionally, [Kaiser and Wright \(2006\)](#) estimated the parameters of their model using data from nine different two-magazine groups in Germany over 30 years. Furthermore, [Sun et al. \(2019\)](#) relied on publicly available resources from the Chinese car-hailing market to determine the most effective pricing strategy for online car-hailing.

3.2 Industry platforms

The preliminary studies in this cluster examined platforms from a component or product perspective, e.g. [Cusumano and Gawer \(2002\)](#) and [Gawer and Henderson \(2007\)](#), and allocated limited attention to platform dynamics, particularly network effects. The shift from the product perspective was marked by a differentiation between two major types of technological platforms: internal platforms and industry platforms ([Gawer and Cusumano, 2008](#)). The industry platforms cluster laid its foundations on three different bodies of literature: product development, where the term “platform” denotes projects that create a new

family of products; technology strategy, which characterizes a platform as valuable points of control and rent extraction; and industrial economics, where platforms enable transactions among the various market sides (Baldwin and von Hippel, 2011). These three bodies of literature have mutual roots in engineering design, specifically in the architecture of platforms, which consist of a stable core (platform) and a variable periphery (complementors). Additionally, Gawer (2014) identified the creation of value through economies of scope in supply and/or demand as another vital commonality and conceptualized platforms as evolving organizations or meta-organizations that “(1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand; and (3) entail a modular technological architecture composed of a core and a periphery” (Gawer, 2014, p. 1239). This conceptualization is built on the economics literature, which views platforms as two-sided markets focusing on pricing and competition, and on the engineering literature, which views platforms as technological architectures emphasizing innovation.

Recently, the topic of platform ecosystems has garnered significant attention in this cluster. Adner (2017, p. 40) defined an ecosystem as “the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize.” However, Jacobides *et al.* (2018) argue that the majority of studies have focused either on the definition of ecosystems or on the way they operate, as seen in works by Teece (2007), Ceccagnoli *et al.* (2012) and Adner (2017), among others. Jacobides *et al.* (2018) delved into the reasons behind the emergence of ecosystems and what sets them apart from other governance forms. They argued that modularity facilitates the emergence of ecosystems and defined them as “groups of firms that must deal with either unique or supermodular complementarities that are nongeneric, requiring the creation of a specific structure of relationships and alignment to create value” (Jacobides *et al.*, 2018, p. 2263). However, this definition has been perceived as broad since it does not necessitate the presence of a platform or interface standards (Teece, 2018).

The preliminary empirical studies in the industry platform cluster extensively relied on case studies of Intel, Microsoft and Cisco, e.g. Gawer and Henderson (2007), and Gawer and Cusumano (2008). However, later on, the cluster’s empirical research expanded to include examinations of several industries. One of the first empirical studies exploring the interaction between industry platforms and industry architecture was conducted by Tee and Gawer (2009), focusing on the i-Mode services in two different territories. Additionally, the topic of disruptive innovation was addressed in the context of industry platforms. Ozalp *et al.* (2018) focused on intergenerational platform-technology transitions, basing their longitudinal study on the launch of 12 different video game consoles. In contrast, Ansari *et al.* (2016) examined disruptive innovation from the complementor’s perspective through a longitudinal case study of a digital video recorder startup firm.

3.3 Digital platforms

The pervasiveness of digitalization has transformed the nature of information technology (IT), creating new customer experiences and altering interactions. Consequently, the Information Systems (IS) literature has shifted its attention beyond administrative systems, well-bounded organizational contexts, and industry boundaries. Emphasizing the importance of understanding the new dynamics in this context, Tilson *et al.* (2010) highlighted that digital infrastructures facilitate the emergence of new combinations of services and competencies, e.g. platforms (Hanseth and Lyytinen, 2010), which are a subcategory of digital infrastructures that feature specific control arrangements. Furthermore, Yoo *et al.* (2010) argued that the IS literature had disregarded the transformative impact of digitalization. They contended that, due to the pervasiveness of

	Two-sided markets	Industry platforms	Digital platforms	Innovation platforms	Two-sided networks
Central themes/ Keywords	- Two-sided markets - Competition - Multi-sided markets - Pricing strategies - Network effects - Multithoming	- Industry platforms - Platform ecosystem - Value creation - Business models - Strategic management - Digital platforms	- Digital platforms - Digital infrastructures - Governance - Boundary resources - Control - Platform ecosystem	- Innovation platforms - Digital entrepreneurs - Entrepreneurship - Innovation and competition - Digital platforms	- Two-sided networks - Network effects - Innovation - Competition - Revisiting conventional approaches and paradigms
Foundations of the cluster	- Network economics - Network externalities - Strategy discussions on the chicken-and-egg problem - Multi-product pricing - Vertical integration - Theory of the firm	- Product development - Technology - Industrial economics - Engineering design (modularity) - Economics of scope in supply and demand	- Digital infrastructures - Layered architecture - Modular - Software-based systems - Innovation networks	- Competition and innovation (Layered) Modular architecture - User Innovation (Digital) - Innovation (Digital) - Entrepreneurship	- Network externalities - Price discrimination - Product differentiation - Competition and innovation - Revisiting conventional approaches, assumptions, and paradigms
Methodological approaches	- Econometric models are quite relevant in this cluster - Single case study - Multiple case studies - Surveys - Longitudinal case studies	- Multiple case studies - Single case study - Longitudinal case studies - Interviews - Comparative case studies	- Single case study - Multiple case studies - Longitudinal case studies - Surveys - Comparative case studies - Interviews	- Multiple case studies - Single case study - Longitudinal case studies - Interviews - Surveys	- Econometric models are relevant in this cluster - Comparative case studies - Multiple case studies - Longitudinal case studies - Single case study - Interviews

(continued)

Table 1.
Comparative analysis
of the five clusters

	Two-sided markets	Industry platforms	Digital platforms	Innovation platforms	Two-sided networks
Examples of studies	- Evans (2003) - Caillaud and Jullien (2003) - Rochet and Tirole (2003) - Armstrong (2006) - Hagiu and Wright (2015) - Hagiu <i>et al.</i> (2020) - Hagiu <i>et al.</i> (2022)	- Cusumano and Gawer (2002) - Gawer and Cusumano (2008) - Gawer and Cusumano (2014) - Gawer (2014) - Adner (2017) - Jacobides <i>et al.</i> (2018) - Teece (2018) - Video games	- Tiwana <i>et al.</i> (2010) - Tilson <i>et al.</i> (2010) - Yoo <i>et al.</i> (2010) - Ghazawneh and Henfridsson (2013) - Wareham <i>et al.</i> (2013) - de Reuver <i>et al.</i> (2018) - Modol and Eaton (2021) - Application developers - Software developers - Mobile platforms - Enterprise software - Smart cities	- Boudreau (2010) - Baldwin and von Hippel (2011) - Boudreau (2012) - Boudreau and Jeppesen (2015) - Eckhardt <i>et al.</i> (2018) - Srinivasan and Venkatraman (2018) - Miric <i>et al.</i> (2019)	- Eisenmann <i>et al.</i> (2011) - Parker <i>et al.</i> (2016) - Parker and Van Alstyne (2018) - Parker <i>et al.</i> (2021) - Van Alstyne and Parker (2017) - Tan <i>et al.</i> (2020) - Parker <i>et al.</i> (2021)
Examples of examined contexts/ industries	- Payment cards - Newspapers/ magazines - E-commerce - Gaming industry - Internet portals	- Advertising - Sharing economy - E-commerce - Servitization	- Sharing economy - Crowdfunding - Software developers - Online communities - Crowdsourcing	- Video games - Software developers - Sharing economy - Internet intermediaries - Blockchain technology	
Source(s): Own elaboration					

digital technologies, a novel type of product architecture had emerged, the layered modular architecture, combining the modular architecture of physical products with the layered architecture of digital technology. Furthermore, [Tiwana et al. \(2010\)](#) argued that the IS literature had given limited attention to the emergence of software-based platforms. Thus, the digital platforms cluster has established its foundations in the engineering literature, which draws from both (physical) product development and software development, easily linking with software architecture.

The majority of studies in this cluster focus on the ecosystem's governance mechanisms, such as boundary resources ([Ghazawneh and Henfridsson, 2013](#)) or entry into the complementor's market ([Foerderer et al., 2018](#); [Young Kang and Suarez, 2022](#)). [Eaton et al. \(2015\)](#) argue that boundary resources are modified through distributed tuning involving a heterogeneous set of actors and artifacts, revealing the bilateral power in the tuning of boundary resources. Consequently, the conceptualization of technological platforms in the digital platforms cluster aligns with the industry platforms cluster's perspective of platforms as organizations or meta-organizations ([Gawer, 2014](#)), where the role of actors is vital in the development and management of digital platforms ([Rolland et al., 2018](#)). Besides, following [Tilson et al.'s \(2010\)](#) suggestion, [Henfridsson and Bygstad \(2013\)](#) employed a multimethod research design, which included a thorough case study and a case survey. They identified three generative mechanisms of digital infrastructure: adoption, innovation and scaling. More recently, [Modol and Eaton \(2021\)](#) provided an overview of a 20-year period, illustrating how the concept of digital infrastructure evolved through three different phases – namely, the entrenchment of the periphery, the mutual entrenchment of the core and the periphery and the entrenchment of the core – and took the architectural form of a digital platform consisting of a core and a periphery.

One of the first empirical studies to examine platform ecosystem governance was that of [Wareham et al. \(2013\)](#), who conducted an in-depth investigation of a business software ecosystem and identified the tensions embedded within it. As the transformative effects of digitalization are better observed over prolonged time frames, longitudinal case studies are quite relevant in this cluster. [Ondrus et al. \(2015\)](#) conducted a longitudinal multi-case study on the mobile payment industry, introducing a decision model that aids the pre-launch decision-making process concerning platform openness. Additionally, [Sandberg et al. \(2020\)](#) examined the transformation of a product platform into an industry platform over a 40-year period by embracing digitization. Nevertheless, the majority of the previously mentioned studies have examined platform governance from the perspective of the platform owner, although a handful of exceptions exist, e.g. [Benlian et al. \(2015\)](#) and [Rolland et al. \(2018\)](#). [Rolland et al. \(2018\)](#) conducted a longitudinal interpretive case study to examine the interplay between digital options and digital debt from a user-centric perspective. They argue that the user-centric perspective complements the platform owner-centric perspective.

3.4 Innovation platforms

The innovation platforms cluster initially focused on computer platforms characterized by an integrated combination of hardware and software architecture. [Boudreau \(2010\)](#) delved into handheld computer systems, aiming to identify possible approaches to opening up a technological platform, whether by granting access, as seen with Apple, or devolving control, as in the case of Linux, and assessing their impact on the firm's rate of innovation. According to [Boudreau \(2010\)](#), in a handheld computer system, the platform is the software or the operating system, with the hardware serving as the complementor. However, network effects do not seem significant in the context of hardware development, as both research and practice have challenged their viability ([Boudreau, 2010](#)). Moreover, through conducting a

longitudinal case study, [Boudreau \(2012\)](#) argues that the performance of handheld computers is impacted by the number of application producers. Nevertheless, unlike [Boudreau's \(2010\)](#) study, this research considers the handheld computer as the platform and the applications as the complementors.

Due to the rapid technological development and the widespread adoption of modular design architectures, open collaborative and single-user innovations have extended beyond traditional contexts of the internet and personal computers ([Baldwin and von Hippel, 2011](#)). [Boudreau and Jeppesen \(2015\)](#) argued that platforms have evolved beyond multi-sided markets, with complementors now engaging beyond traditional pricing systems. Despite not being paid, complementors are motivated by various sources, including intrinsic and learning motivations ([Boudreau and Jeppesen, 2015](#)). With the advent of digitalization and the evolution of platform architecture, digital entrepreneurs have taken center stage. Platform firms heavily depend on digital entrepreneurs to develop third-party applications, as exemplified by Apple's iOS ([Srinivasan and Venkatraman, 2018](#)). Consequently, digital entrepreneurs play a significant role in supporting digital platforms ([Eckhardt et al., 2018](#); [Srinivasan and Venkatraman, 2018](#)). [Nambisan et al. \(2018\)](#) argue that two distinct phenomena have influenced the nature of entrepreneurship: open innovation, characterized by the emergence of open and distributed modes of innovation, and platformization, marked by the widespread prevalence of digital platforms. As a result, new forms of entrepreneurship have emerged, where entrepreneurs function as complementors to existing digital platforms ([Nambisan et al., 2018](#)), operating in nontraditional environments ([Miric et al., 2019](#)).

Initially, this cluster heavily relied on empirical studies related to computer platforms. Subsequently, these studies transitioned from traditional contexts to novel innovation activities. [Boudreau \(2017\)](#) investigated boundary choices in mobile computing platforms over 20 years, revealing that the openness vs control tradeoff is avoidable, as firms can simultaneously open up their platforms and maintain coordination. Additionally, [Nucciarelli et al. \(2017\)](#) explored the effects of crowdfunding, an implementation of open innovation, on the value created by opening up the business model to the crowd. They employed a multiple case study approach in the digital game industry, demonstrating that crowdfunding benefits surpass those of traditional fundraising. Also, [Boudreau \(2021\)](#) utilized a mixed-methods approach to study an online game and examined funders' motivations to crowdfund entrepreneurial ventures. Consequently, they identified three specific motivations: empathy and common cause, encouraging other funders and reciprocity. Moreover, relying on an information-based theory of entrepreneurial activity and testing it with 1,000 complementary apps, [Eckhardt et al. \(2018\)](#) argue that complementors who launch a free introductory application are more likely to commercialize it in response to specific types of information.

3.5 Two-sided networks

Despite having its roots in the network externality literature, an increased interest in the interactions between platform innovation and platform competition has been one of the main drivers behind the emergence of this cluster, akin to the innovation platforms cluster. [Eisenmann et al. \(2011\)](#) integrated research from both network theory and bundling to illustrate the economic and strategic motivations of platform envelopment. Platform envelopment represents a novel market entry path distinct from Schumpeter's theory of innovation, where the user base is the valuable resource, and managing envelopment is considered a dynamic capability ([Eisenmann et al., 2011](#)). Furthermore, upon studying developers' role in inverting platforms, [Parker et al. \(2016\)](#) examined key strategic decisions that platforms face: the level of openness and the duration of intellectual property in a platform ecosystem. These decisions are influenced by competition and vertical integration levels, the number of developers and

innovation risk. However, they, in turn, impact developers' innovation capacity and sponsors' pricing power (Parker and Van Alstyne, 2018). Consequently, the innovation versus access tradeoff was taken a step further with the inclusion of intellectual property duration, linking the innovation literature to developers' competition, spillovers, and network effects (Parker *et al.*, 2016; Parker and Van Alstyne, 2018).

Rethinking conventional approaches, assumptions and paradigms is particularly relevant in this cluster. In the internet economy, supply-side economies of scale are no longer the driving force, and managing high fixed-cost resources does not guarantee market power. Instead, Van Alstyne *et al.* (2016a), and Van Alstyne and Parker (2017) argue that demand-side economies of scale are the new driving force, and network effects now serve as the foundation for gaining a competitive edge. Additionally, Anderson *et al.* (2014) found that the conventional winner-takes-all wisdom no longer applies in the presence of strong cross-network externalities. Further, while Porter's Five Forces Model can still be applied to platforms, Van Alstyne *et al.* (2016a) emphasize that the forces behave differently, and new factors, such as network effects, should be considered. Even the pricing results of the existing platform literature were revisited; Tan *et al.* (2020) argued that reducing prices on one side and increasing them on the other might be suboptimal in the face of integration investment. Similarly, conventional merger policies that were adopted during the industrial era can no longer be applied (Parker *et al.*, 2021). More recently, Li *et al.* (2021) introduced the two-zoned network (2ZN) model as a comprehensive framework that better illustrates platform competition, as the two-sided network model failed to fully capture the dynamics of platform competition.

Econometric models dominate this cluster, with a paucity of empirical studies. To examine the challenges that platform managers face, Eisenmann (2008) conducted a multi-year research project on platform strategies, including interviews with thirty companies. Additionally, to identify the factors that induce platform owners to close or open their platforms, Eisenmann *et al.* (2008) compared openness by role in platform-mediated networks, including Linux, Windows, Macintosh and iPhone. Besides, upon developing the platform envelopment framework, Eisenmann *et al.* (2011) created a database of academic papers on both network effects and platforms, developed econometric models to examine the economics of envelopment strategies and established a collection of case study data to test the novel framework. Furthermore, by studying success and failure case studies, Van Alstyne *et al.* (2016b) identified six reasons underlying the failure of platform firms. Additionally, after presenting their new 2ZN model, Li *et al.* (2021) conducted four distinct case studies to illustrate the features of the new model and compare them with those of the two-sided network model.

4. The three fundamental concerns

The co-citation analysis and examination of the five clusters have disclosed the structure of the industry platforms literature, revealing the existence of fundamental concerns within this body of work. Table 2 provides a comprehensive overview of the diverse research concerns across these five clusters: terminologies, definitions and classifications, and perspectives. Accordingly, we pose several research questions to address the identified concerns.

4.1 Terminologies

Throughout this article, we adopted the term "*industry platforms*" (Gawer and Cusumano, 2014, p. 420) to refer to technological platforms that are associated with network effects. However, this term is relevant in only the second cluster, that is, the industry platforms

cluster. Other clusters have completely different designations for such platforms, as shown in [Table 2](#). For instance, the term “multi-sided markets” is widely used in the two-sided markets cluster. On one hand, upon classifying technological platforms as product or industry platforms, [Gawer and Cusumano \(2014, p. 422\)](#), who are the pioneers of the industry platforms cluster, argue that “. . . not all multi sided markets are industry platforms as we describe them in this paper. Double sided markets where the role of the platform is purely to facilitate exchange or trade, without the possibility for other players to innovate on complementary markets, seem to belong to the supply-chain category. A multi sided market that stimulates external innovation could be regarded as an industry platform. However, while all industry platforms function in this way, not all multi sided markets do.” Therefore, multi-sided markets fall in a gray area between supply-chain platforms and industry platforms. Besides, according to the industry platforms cluster, unlike industry platforms, supply-chain platforms are not associated with the presence of network effects ([Gawer and Cusumano, 2008](#)). Thus, multi-sided markets that facilitate transactions between different actors are supply-chain platforms, which are not associated with network effects, while those that allow complementors to innovate on top of the platform are industry platforms, which are associated with network effects. On the other hand, based on the two-sided markets cluster, multi-sided platforms are associated with the presence of network effects ([Evans, 2003](#)). Also, according to [Hagiu et al. \(2020\)](#), all the following firms are referred to as multi-sided platforms: Airbnb, Alibaba, eBay, Expedia, Facebook, Tencent, Apple Store and Force.com. Take eBay as an example. In simplistic terms, eBay facilitates transactions between buyers and sellers. Thus, according to the industry platforms cluster, eBay is categorized as a multi-sided market falling into the supply-chain category, which is not associated with network effects. However, from the lens of the two-sided markets cluster, eBay is seen as a multi-sided platform that is associated with network effects. So, what are multi-sided platforms? Are they associated with network effects or not? Furthermore, even gyms, which are a more physical example, are considered multi-sided platforms, as many gyms have started renting out parts of their facilities to specialty studios that offer classes to gym members ([Hagiu et al., 2020](#)).

Not only are there naming differences, but inconsistencies in terminology also arise among various clusters. The digital platforms cluster adopted the term “digital platforms” to describe software-based platforms, including, [Ghazawneh and Henfridsson \(2015\)](#) and [de Reuver et al. \(2018\)](#), to mention a few. More recently, the industry platforms cluster has adopted the same term to denote platforms previously called industry platforms, including [Helfat and Raubitschek \(2018\)](#), [Bonina et al. \(2021\)](#) and [Gawer \(2022\)](#), among others. However, this shift has led to criticism from the digital platforms cluster, asserting that, when tackling the topic of digital platforms, the industry platforms cluster overlooks the theoretical significance of technology, or digitality in particular ([de Reuver et al., 2018](#)). This critique by [de Reuver et al. \(2018\)](#) highlights the industry platforms cluster’s broad treatment and classification of technological platforms. The digital platforms cluster, as defined by [de Reuver et al. \(2018, p. 126\)](#), characterizes digital platforms as “purely technical artefacts where the platform is an extensible codebase, and the ecosystem comprises third-party modules complementing this codebase.” This definition aligns with the industry platforms cluster’s concept of innovation platforms, which serve as a technological foundation for complementary innovations, exemplified by Apple iOS ([Cusumano et al., 2019](#)). However, innovation platforms represent only one category of industry platforms. The second category, transaction platforms, focuses on facilitating transactions between different actors, illustrated by the Apple AppStore ([Cusumano et al., 2019](#)). Thus, the definition of transaction platforms deviates from that of digital platforms as defined by the digital platforms cluster. Despite their omnipresence and potential status as the iconic

organizational form in the era of digitalization (Gawer, 2022), digital platforms *per se* remain undefined (Bonina *et al.*, 2021). This ambiguity raises the question of whether all industry platforms can be categorized as digital platforms, or if a distinction exists between digital and non-digital platforms. Furthermore, are all multi-sided platforms digital ones? Is eBay considered a digital platform or not? According to the digital platforms cluster, eBay is not a digital platform since it does not provide an extensible codebase. Therefore, is the presence of an extensible codebase the distinguishing factor between a digital platform and a non-digital one?

Inconsistencies also arise in the application of the term “innovation platforms.” This term is mainly used in two different clusters, the industry platforms cluster and the innovation platforms cluster. According to Gawer (2021, p. 8), an innovation platform “serves as a technological foundation upon which other firms develop complementary innovations,” e.g. Apple iOS. However, Baldwin and von Hippel (2011, p. 1412) offer a different perspective, “Innovation platforms are components that provide a stable framework or binding surface that serves to support and organize the innovation contributions of many complementors (Gawer and Cusumano, 2002; Gawer and Henderson, 2007; Baldwin *et al.*, 2009; Gawer, 2009). Platforms can range from interface standards such as an application programming interface or a screw thread specification, to open source software platforms like Apache or Linux, to social networking sites like Facebook.” Consequently, Baldwin and von Hippel (2011) classified social networking sites, such as Facebook, as innovation platforms. However, according to Cusumano *et al.* (2019) and Gawer (2021), Facebook for developers qualifies as an innovation platform, while Facebook’s social network is labeled a transaction platform rather than an innovation platform. This discrepancy prompts the question: which platforms can be classified as innovation platforms, and which ones cannot?

These were just a few examples from the literature, yet it is clear that inconsistent terminologies exist in the literature. These variations create confusion for any reader, whether academic or not, and have the potential to impede the field’s evolution due to the associated confusion they generate. In light of the aforementioned considerations, we pose the following research questions: Why are different terminologies employed to refer to the same phenomena, namely, platforms associated with network effects? How have these terminologies evolved over time within the industry platforms literature, and what factors contributed to the evolution of these terminologies and conceptualizations? How might interdisciplinary collaboration contribute to a more integrated and cohesive conceptualization of platforms that are associated with network effects? How can the inconsistencies in terminologies across different clusters be addressed to establish a more standardized language in the field of industry platforms, thereby fostering clearer communication and coherence within the discipline?

4.2 Classifications

The differences arise not only in the terminologies of industry platforms but also in their classifications. In the two-sided markets cluster, Evans and Schmalensee (2008) were among the very few scholars who classified two-sided platforms into four different categories: (1) exchanges: platforms that assist buyers and suppliers in searching for feasible contracts and accordingly facilitate transactions between the different sides, e.g. eBay; (2) advertiser-supported media: platforms that either create content, e.g. magazines, or buy content, e.g. free television; (3) transaction devices: platforms that connect merchants and their customers, e.g. payment cards; and (4) software platforms: platforms that provide services for application developers, e.g. video game industry. Besides, in the industry platforms cluster, Gawer and Cusumano (2008) identified two major types of

technological platforms: internal platforms and industry platforms. Furthermore, supply-chain platforms represent a distinct category of internal platforms where external firms supply intermediate components to the platform owner. This special type of platform differs from industry platforms in that, in the latter, external firms do not necessarily trade with each other, nor do they belong to the same supply chain (Gawer and Cusumano, 2014). Furthermore, Cusumano *et al.* (2019) identified two different categories of industry platforms based on their primary functions: (1) transaction platforms, which facilitate transactions between different actors, e.g. Apple AppStore; and (2) innovation platforms, which facilitate complementary innovations as the platform serves as a technological foundation, e.g. Apple iOS. Additionally, hybrid platforms fall in between and share functions of the two main categories, e.g. Apple (Cusumano *et al.*, 2019). In the digital platforms cluster, de Reuver *et al.* (2018) distinguished between two types of platforms based on their degree of digitality: (1) digital platforms, which provide an extensible codebase for third-party complementors to develop on; and (2) non-digital platforms, which solely mediate transactions between the different sides of the platform without providing an extensible codebase. Furthermore, Ghazawneh and Henfridsson (2015) examined digital application marketplaces, identifying four distinct types based on their control arrangements and the functional scope: (1) closed marketplaces, where control is centralized and application functionality is narrow, e.g. Army Software Marketplace; (2) censored, where control is centralized and application functionality is broad, e.g. Apple AppStore; (3) focused, where control is decentralized and application functionality is narrow, e.g. Taobao App Market; and (4) open marketplaces, where control is decentralized and application functionality is broad, e.g. Jolla Store. Additionally, the innovation platforms cluster has its own classifications. Upon examining the non-price instruments that multi-sided platforms rely on to regulate their platforms and ecosystems, Boudreau and Hagiu (2008) explored two digital multi-sided platforms, Facebook and TopCoder, and two non-digital multi-sided platforms, Roppongi Hills and Harvard Business School. Thereby, classifying multi-sided platforms into two distinct types: digital and non-digital multi-sided platforms. Also, Boudreau and Lakhani (2009) classified platforms based on their corresponding business models: (1) integrator platform, where the platform owner acts as a middle-man between customers and external innovators, e.g. app stores; (2) product platform, where the platform serves as a foundation for third-party complementors to develop and sell their offerings to customers, e.g. Google Cloud Computing Services; and (3) two-sided or multi-sided platform, where third-party innovators can directly transact with customers but should affiliate with the platform, e.g. Facebook advertisers. Even the two-sided networks cluster has its own classification. Eisenmann (2008) identified four distinct types of platforms based on both the role of the platform and the number of firms in each role: (1) proprietary: a single provider and a single sponsor, e.g. PlayStation; (2) shared: multiple providers and multiple sponsors, e.g. DVD; (3) licensing: multiple providers and a single sponsor, e.g. Palm operating system; and (4) joint venture: a single provider and multiple sponsors, e.g. CareerBuilder.

In light of this discussion, several questions arise regarding the different definitions and classifications. Why do different classifications exist to categorize the same phenomena, namely platforms associated with network effects? In what manner did the classifications evolve over time, and did they mirror the evolution of diverse terminologies within the industry platforms' literature? In what ways can interdisciplinary collaboration contribute to the synthesis of definitions and classifications, drawing insights from fields such as sociology, economics and technology studies to create a more holistic understanding? How could a unified framework for defining and classifying industry platforms be developed to consider the diverse perspectives and classifications found across different clusters, fostering a more cohesive and comprehensive understanding within the field?

	Two-sided markets	Industry platforms	Digital platforms	Innovation platforms	Two-sided networks
Terminologies	<ul style="list-style-type: none"> - Two-sided markets - Two-sided platforms - Multi-sided platforms - Platforms 	<ul style="list-style-type: none"> - Industry platforms - Platforms - Digital platforms - Double-sided markets 	<ul style="list-style-type: none"> - Digital platforms - Software-based platforms - Digital infrastructures - Platforms 	<ul style="list-style-type: none"> - Innovation platforms - Multi-sided platforms - Digital platforms - Two-sided platforms - Platforms 	<ul style="list-style-type: none"> - Two-sided networks - Platforms - Two-sided markets - Multi-sided platforms
Definitions	<p>“technologies, products or services that create value primarily by enabling direct interactions between two or more customer or participant groups” (Häggü, 2014, p. 71)</p> <p>Classified two-sided platforms into four different types (Evans and Schmalensee, 2008)</p> <ul style="list-style-type: none"> - Exchanges - Advertiser-supported media - Transaction devices - Software platforms 	<p>“products, services or technologies developed by one or more firms, and which serve as foundations upon which a larger number of firms can build further complementary innovations and potentially generate network effects” (Gawer and Cusumano, 2014, p. 420)</p> <p>Classified platforms based on their primary function (Cusumano et al., 2019)</p> <ul style="list-style-type: none"> - Transaction platforms - Innovation platforms - Hybrid platforms 	<p>“purely technical artefacts where the platform is an extensible codebase, and the ecosystem comprises third-party modules complementing this codebase” (de Reuver et al., 2018, p. 126)</p>	<p>“components that provide a stable framework or binding surface that serves to support and organize the innovation contributions of many complementors” (Baldwin and von Hippel, 2011, p. 1412)</p>	<p>“products and services that bring together groups of users in two-sided networks” (Eisenmann et al., 2006, p. 2)</p>
Classifications	<p>Classified two-sided platforms into four different types (Evans and Schmalensee, 2008)</p> <ul style="list-style-type: none"> - Exchanges - Advertiser-supported media - Transaction devices - Software platforms 	<p>Classified platforms based on their primary function (Cusumano et al., 2019)</p> <ul style="list-style-type: none"> - Transaction platforms - Innovation platforms - Hybrid platforms 	<p>Classified platforms based on the degree of digitality (de Reuver et al., 2018)</p> <ul style="list-style-type: none"> - Digital platforms - Non-digital platforms - Identified four distinct digital application marketplaces based on the control arrangements and on the functional scope (Ghazawneh and Henfridsson, 2015) - Closed marketplaces - Censored marketplaces - Focused marketplaces - Open marketplaces 	<p>Classified platforms based on their corresponding business models (Boudreau and Lakhani, 2009)</p> <ul style="list-style-type: none"> - Integrator platforms - Product platforms - Two-sided or multi-sided platforms 	<p>Classified platforms based on the role of the platform and the number of firms in each role (Eisenmann et al., 2008)</p> <ul style="list-style-type: none"> - Proprietary platforms - Shared platforms - Licensing platforms - Joint venture platforms
Perspectives	<p>The platform owner's perspective is relatively dominant</p>	<p>The platform owner's perspective is relatively dominant with very few exceptions, e.g. Ansari et al. (2016)</p>	<p>Platform owner's perspective is relatively dominant with very few exceptions, e.g. Benlian et al. (2015), and Roland et al. (2018)</p>	<p>Complementor's perspective</p> <p>Platform owner's perspective</p> <p>Dyadic perspective</p>	<p>The platform owner's perspective is relatively dominant</p>
Source(s):	Own elaboration				

Table 2. Fundamental areas of concerns in the literature on industry platforms

4.3 Perspectives

The majority of the industry platforms literature has initially focused on platforms from the perspective of the platform owner. The two-sided markets cluster, the pioneering cluster, has consistently explored competition between platforms. Even in the early case studies of Intel, Microsoft and Cisco, the industry platforms cluster approached the examination of industry platforms primarily through the lens of the platform owner. Similarly, the digital platforms cluster has consistently examined the topic of governance from the perspective of the platform owner. Likewise, the two-sided networks cluster has always examined the interaction between platform innovation and platform competition through the lens of the platform owner. Nevertheless, it is important to recognize that platform dynamics can be examined at different levels and from various perspectives. [Tiwana \(2015\)](#) argues that the majority of previous studies have focused on competition among platforms rather than within them. We argue that platform competition occurs at least at three different levels: (1) competition between platforms themselves, e.g. Apple iOS vs Samsung Android; (2) competition between platforms and their complementors, e.g. Microsoft Edge vs Google Chrome; and (3) competition between complementors themselves, e.g. Battlefield vs Call of Duty. The same holds true for platform ecosystem governance and platform openness, which is a governance-related concept, as the majority of relevant studies have discussed these topics from the perspective of the platform owner, or, the macro level. However, the topic of governance can also be examined from the perspective of third-party developers, that is the micro level, as demonstrated by [Benlian et al. \(2015\)](#), or even from the user-organization perspective, as shown by [Rolland et al. \(2018\)](#). [Rolland et al. \(2018\)](#) argue that the user-centric perspective does not diminish the owner-centric perspective; rather, it complements it. Also, [Constantinides et al. \(2018\)](#) argue that the complementor perspective is as important as the platform owner perspective, but the former is examined less frequently in the literature. In contrast to other clusters, the innovation platforms cluster, particularly in recent literature, has dedicated significant attention to the perspective of third-party complementors, as shown by [Nambisan et al. \(2018\)](#), [Srinivasan and Venkatraman \(2018\)](#), [Boudreau \(2021\)](#), [Miric et al. \(2019\)](#), and [Wu et al. \(2022\)](#), among others. However, it is essential to note that the platform owner's perspective continues to hold significance within this cluster. Additionally, several studies have contributed to both perspectives, namely, those of the platform owner and third-party complementors. For example, [Srinivasan and Venkatraman \(2020\)](#) analyzed platform providers' actions, the strategic choices of external complementors, and how these actions coevolve. This analysis provided insights into platform evolution and architectural convergence from a dyadic and dynamic perspective. Accordingly, we argue that a holistic view of platforms and their ecosystems cannot be achieved until various topics are explored from the perspectives of the different actors in the ecosystem, which includes four different players: platform owner, platform provider, producers, and consumers ([Van Alstyne et al., 2016a](#)).

The perspective adopted by certain clusters has hindered the exploration of understudied aspects of industry platforms. In the two-sided markets cluster, the different sides of the market, including complementors, are perceived as simple consumers ([Gawer, 2014](#)). For instance, innovation built upon the platform is considered a decision related to consumption ([Gawer, 2014](#)). Consequently, when viewing the different sides as consumers, the two-sided markets cluster overlooks the competitive interactions occurring between the platform owner and the external complementors, as well as among the external complementors themselves. Thus, from the perspective of the two-sided markets cluster, competition in the context of industry platforms is exclusively between one platform and another. For this reason, the two-sided markets cluster has consistently examined competition from the platform owner's perspective. This tendency is also observed in the industry platforms cluster and the two-sided networks cluster, as they have been strongly influenced by the conceptualizations of

the two-sided markets cluster. Besides, the digital platforms cluster's consistent focus on the platform owner's perspective may be attributed to the cluster's perception of the platform owner sitting at the center of the ecosystem, bearing the responsibility of governing the various ecosystem actors.

Given this discussion, several questions emerge concerning the dominance of the platform owner's perspective in the industry platforms literature. How has the dominance of the platform owner's perspective influenced the overall trajectory of research within the industry platforms literature? To what extent does the platform owner's perspective contribute to potential biases in the analysis and interpretation of industry platform dynamics, and how might this impact the broader understanding of the field? In what ways can research efforts be redirected or expanded to ensure a more balanced exploration of industry platform dynamics, considering perspectives beyond that of the platform owner? To what degree do alternative perspectives, such as those of third-party developers or users, offer valuable insights that may be overlooked when primarily examining the industry platforms from the platform owner's viewpoint? How might the industry platforms literature benefit from incorporating a more pluralistic approach, considering the interplay of perspectives from various stakeholders, to enhance the richness and depth of research insights?

5. Conclusion

The industry platforms literature has experienced substantial growth over the past 20 years, giving rise to various research streams. However, the comprehension of platforms is dispersed across these streams, each delving into distinct aspects of industry platforms. We suggest that the harnessing of this diverse body of knowledge can be pushed further, aiming to deepen our understanding of industry platforms and foster a holistic view of platforms and their ecosystems. As an initial step toward achieving this objective, we conducted an extensive analysis of 458 articles using bibliometric methods and systematic review techniques. Our aim is to reveal the underlying structure of the literature, identify key research concerns and offer insightful suggestions for future research. First, through co-citation analysis, we identified five clusters based on diverse bodies of literature: two-sided markets, industry platforms, digital platforms, innovation platforms and two-sided networks. The roots of the industry platforms literature are often attributed to the economics of network externalities and strategic discussions regarding the chicken-and-egg dilemma, namely, the two-sided markets cluster (Katz and Shapiro, 1985; Caillaud and Jullien, 2001, 2003; Rochet and Tirole, 2003). Consequently, the two-sided markets cluster was the first to gain traction, primarily focusing on the issue of competition between platforms. Subsequently, the industry platforms cluster emerged, serving as a bridge between the economics literature, which emphasizes competition, and the engineering design literature, which focuses on innovation (Gawer, 2014). Around 2010, the rest of the clusters began to emerge. The digital platforms cluster gained prominence following the works of Tilson *et al.* (2010), Tiwana *et al.* (2010), and Yoo *et al.* (2010), who highlighted the limited attention given to the topic by IS scholars. Additionally, the innovation platforms cluster and the two-sided networks cluster emerged due to the increased interest in the interaction between competition and innovation topics (Gawer, 2014), as evidenced by the publications of Boudreau (2010) and Eisenmann *et al.* (2011).

Our bibliometric analysis, coupled with our systematic review, unveiled three critical areas of concern that demand attention for a more effective harnessing of this diverse body of work: terminologies, definitions and classifications, and perspectives. As for the terminologies, the issue extends beyond various terminologies being used to refer to the same phenomena. Inconsistent terminologies are being adopted, creating a sense of confusion that might lead to different interpretations of research findings when harnessing knowledge

from diverse fields. Furthermore, various clusters employ different classifications for industry platforms. Consequently, there is still uncertainty regarding the various types of existing platforms and business models, as well as the evolutionary pathways these platforms take over time. For example, while some scholars have explored the transition of a two-sided platform into a multi-sided platform (Zhao and Chen, 2019), others have investigated the evolution of a hub-and-spoke multi-sided platform into a networked multi-sided platform, ultimately transforming into a symbiotic multi-sided platform (Tan *et al.*, 2015). Therefore, to further optimize the effective utilization of this diverse body of knowledge, we suggest fostering collaboration among scholars, both within and across different clusters, in order to adopt a common language, encompassing shared terminologies, definitions and classifications. Furthermore, the majority of the literature on industry platforms has examined platforms from a single perspective, the platform owner's perspective. Nevertheless, the platform owner is only one player in the ecosystem, which includes four different players: platform owner, platform provider, producers and consumers (Van Alstyne *et al.*, 2016a). Therefore, to contribute to the progress of the literature and the development of a holistic view of platforms and their ecosystems, it is essential to examine platforms not only from the perspective of the platform owner but also from the viewpoints of the different players within the ecosystem.

Lastly, like any other research paper, our paper is not without limitations. First, we relied solely on Scopus to obtain the articles for our bibliometric analysis and systematic review. However, other databases, such as the Web of Science (Falagas *et al.*, 2008), could be used, or they could even be combined with Scopus to generate a new list of articles. Additionally, we used VOSviewer to conduct our bibliometric analysis. However, other software, such as Leximancer (Wilden *et al.*, 2016) could also be utilized to conduct a bibliometric analysis.

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