

# BREAKING DOWN THE BLACK BOX OF INDUSTRY PLATFORM PROCESSES: A SYSTEMATIC LITERATURE REVIEW AND RESEARCH AGENDA

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## ABSTRACT

**Purpose:** Despite the increasing prevalence of industry platforms, we still lack a comprehensive understanding of the processes that platform owners should undertake. Our knowledge of how these platforms are created, how they attract and integrate various actors, how they design governance mechanisms, how they manage internal and external issues, and how they evolve remains fragmented across different literatures. Moreover, our understanding of the antecedents and outcomes of these processes is limited.

**Design/Methodology/Approach:** A systematic literature review of 442 articles from top-tier journals focused on industry platforms.

**Findings:** This study makes three significant contributions: (1) identifying the key processes that platform owners pursue in the context of industry platforms, (2) identifying the antecedents and outcomes of these processes, and (3) presenting a comprehensive research agenda to guide future research on industry platforms.

**Originality/Value:** Although previous literature reviews on this topic and other related ones have contributed valuable insights to the literature and we have leveraged them to enhance our understanding of industry platforms, none of these studies have comprehensively examined the processes involved in a platform owner's journey, including their antecedents and outcomes. Therefore, this study is the first to address this gap in the literature by comprehensively examining the black box of industry platform processes that platform owners undergo.

**KEYWORDS:** industry platforms, two-sided markets, digital platforms, multi-sided platforms, network effects, micro-processes

## 1. INTRODUCTION

The examination of the credit card industry and the associated antitrust cases were the driving force behind the subsequent research on the topic of two-sided markets, which was initiated by the economics literature (de Reuver et al., 2018). In two-sided markets, value is generated through the coordination of various market actors (Gawer, 2014), with pricing as a key mechanism to achieve such coordination (Caillaud & Jullien, 2001; Caillaud & Jullien, 2003; Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006; Rochet & Tirole, 2006; Eisenmann et al., 2006; Rysman, 2009). By integrating insights from both the economics and engineering literature (Baldwin & Woodard, 2009), which conceptualize platforms as intentionally designed technological architectures that foster innovation, Gawer (2014) bridged the two perspectives and, along with Cusumano, coined the term "industry platforms" (Gawer & Cusumano, 2014a). 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 & Cusumano, 2014: 420), where network effects are the most prominent feature that sets industry platforms apart from supply-chain or product platforms. Furthermore, in response to Tilson et al. (2010), Yoo et al. (2010), and Tiwana et al. (2010) regarding the scant attention given by Information Systems (IS) scholars to the subject of platforms, several scholars have since addressed the topic, including, Ghazawneh & Henfridsson (2013), Huber et al. (2017), and Foerderer et al. (2018). As the platform architecture consists of a stable core, a variable periphery, and interfaces, with control over the interfaces equating to control over the platform interfaces (Baldwin & Woodard,

2009), the IS literature has primarily focused on governance mechanisms which are concerned with behavioural complexities (Constantinides et al., 2018).

The fragmented structure of the industry platforms literature, as discussed earlier, led to each literature focusing on distinct aspects of industry platforms. While this approach allowed us to gain valuable insights into different processes related to industry platforms, it also meant that these processes were examined in isolation. For instance, the economics literature has provided valuable insights into platform competition and the use of pricing as a means to integrate various market actors and as a coordination mechanism (Caillaud & Jullien, 2001; Caillaud & Jullien, 2003; Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006; Rochet & Tirole, 2006; Eisenmann et al., 2006; Rysman, 2009); and the information systems literature, building on the engineering viewpoint of platform architecture (Baldwin & Woodard, 2009), has provided significant insights into platform governance (Tilson et al., 2010; Yoo et al., 2010; Tiwana et al., 2010; Ghazawneh & Henfridsson, 2013; Wareham et al., 2014; Eaton et al., 2015; Huber et al., 2017). Although various literatures have offered valuable insights into different processes related to industry platforms, these processes are like puzzle pieces of a larger puzzle. As a result, we still do not fully understand all the processes that platform owners go through. Additionally, certain processes remain understudied in the literature, such as how platforms emerge (Gawer & Cusumano, 2014; Gawer, 2014; Tan et al., 2015; de Reuver et al., 2018; Shi et al., 2021) and how they evolve (Gawer, 2021). Besides, the different literatures have not only neglected certain processes but have also limited the scope of the topics they have discussed. For example, regarding the integration of different market actors, the economics literature has predominantly focused on pricing mechanisms (Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006; Rochet & Tirole, 2006; Eisenmann et al., 2006; Rysman, 2009), creating an impression that these are the only means of attracting different actors to the platform. However, recent literature has revealed that non-pricing mechanisms (Eisenmann & Hagiu, 2007; Sridhar et al., 2011; Hagiu & Spulber, 2013; Fang et al., 2021) can also play a significant role in attracting different actors to the platform and in coordinating their behavior and interactions. Furthermore, in designing governance mechanisms, the literature has exclusively emphasized hard governance mechanisms (Ghazawneh & Henfridsson, 2013; Parker & Van Alstyne, 2018; Foerderer et al., 2018; Young Kang & Suarez, 2022) to the extent that the existence of soft governance mechanisms has been overlooked (Foerderer et al., 2021). However, recent literature has highlighted the significant role that soft governance mechanisms play in coordinating the various actors on the platform, e.g., awards (Foerderer et al., 2021). Additionally, while the literature has primarily addressed competition-related managerial issues, such as, multi-homing (Eisenmann et al., 2006) (Doganoglu & Wright, 2006) (Armstrong & Wright, 2007) (Doganoglu & Wright, 2010) (Belleflamme & Peitz, 2019) (Bakos & Halaburda, 2020) (Wiegand et al., 2022), winner-take-all (Eisenmann et al., 2006) (Cennamo & Santalo, 2013), and envelopment (Eisenmann et al., 2006), there are other non-competition related challenges that also require attention and management, e.g., hiring (Ge et al., 2020).

In order to bridge this gap, this study aims to perform a comprehensive and systematic literature review that encompasses various works pertaining to platforms associated with network effects, that is, two-sided markets (Caillaud & Jullien, 2001; Caillaud & Jullien, 2003; Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006), two-sided networks (Parker & Van Alstyne, 2005), multi-sided platforms (Hagiu & Wright, 2015), industry platforms (Gawer & Cusumano, 2014a), digital platforms (de Reuver et al., 2018), and innovation platforms (Zahra & Nambisan, 2011), allowing for an in-depth exploration of the distinct processes that platform owners undergo. Our study is based on a comprehensive systematic literature review of 447 articles that were published in top-tier journals, specifically focusing on industry platforms while disregarding studies that examine internal, company, product, and supply-chain platforms. Besides, although previous literature reviews on this topic and other related ones, including, (Roson, 2005), (D. P. McIntyre & Subramaniam, 2009), (D. P. McIntyre & Srinivasan, 2017), (de Reuver et al., 2018), (Constantinides et al., 2018), (Rietveld & Schilling, 2020), (Kapoor et al., 2021), and (Trabucchi & Buganza, 2022b), have contributed valuable insights to the literature and we have leveraged them to enhance our understanding of industry platforms, none of these studies have comprehensively examined the processes involved in a platform owner's journey,

including their antecedents and outcomes. Consequently, this study contributes to the literature on industry platforms by: (1) identifying the key processes pursued by platform owners in the context of industry platforms, (2) identifying the antecedents and outcomes associated with these processes, and (3) presenting a comprehensive research agenda to direct future research efforts on industry platforms.

## 2. METHODOLOGY

This systematic literature review adheres to Tranfield et al.'s (2003) widely recognized guidelines, which involve defining search terms, identifying relevant journals, and establishing criteria for the selection of pertinent articles. We narrowed our focus to academic journals that spanned a range of disciplines, including, accounting, economics, econometrics and statistics, entrepreneurship and small business management, finance, general management, ethics, gender, & social responsibility, human resource management and employment studies, information management, innovation, marketing, operations and technology management, operations research and management science, organization studies, and strategy. Furthermore, we utilized Elsevier's Scopus, which is widely regarded as the premier tool for conducting literature searches (Falagas et al., 2008), to identify and search for our selected keywords.

Our objective was to select articles containing one of the following keywords in their title, keywords, or abstract (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 "multi sided market\*" OR "multi-sided market\*" OR "multisided market\*" OR "multi sided platform\*" OR "multi-sided platform\*" OR "multisided 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 "platform-based organization\*". However, to focus only on industry platforms, and because an industry platform is set apart from an internal platform or a supply chain platform by its ability to generate network effects (Gawer & Cusumano, 2014b), we included a second search string where we required that the selected articles should include "network e\*", which refers to network effect, network effects, network externality, or network externalities, in their full text. Initially, our search yielded 448 articles, out of which 27 had to be excluded since they did not pertain to industry platforms and instead focused on internal or supply-chain platforms. Subsequently, upon reviewing the reference lists of the selected articles, we identified an additional 26 articles that satisfied our inclusion criteria, bringing the final count to 447 articles.

## 3. INDUSTRY PLATFORM PROCESSES

Based on the systematic review that we have conducted, we were able to identify five different processes that a platform owner undergoes: (1) creation process, (2) integration process, (3) design process, (4) management process, and (5) evolution process. Besides, it is important to note that in this paper, we will be relying on Cusumano et al.'s (2019) classification of industry platforms. They distinguish between two primary types of industry platforms: transaction platforms, which enable exchanges or transactions between different parties, such as the Apple AppStore, and innovation platforms, which facilitate complementary innovations by serving as a technological foundation, such as Apple iOS. Additionally, hybrid platforms, such as Apple, share functions of both the transaction and innovation platforms (Cusumano et al., 2019).

### 3.1 Micro-processes of industry platform creation

The topic of platform emergence, or the process of creating industry platforms (Gawer & Cusumano, 2008), has been under-researched in academic literature (Shi et al., 2021; Gawer, 2014; Tan et al., 2015; de Reuver et al., 2018). Recently, Teece et al. (2022) proposed a classification system for platforms based on their origins and value proposition in the value chain. This classification includes incumbent-born platforms, created by incumbent firms targeting existing customers, platform-born

adjacent, created by incumbent companies targeting new customers in different markets, and born-platform startups, created by entrepreneurs offering innovative products and services using new technology to target new customers (Teece et al., 2022). Given this classification and based on our review, we further categorize the process of industry platform creation into incumbent-born platforms and born-platforms.

On one hand, incumbent-born platforms are those platforms that originate from incumbent firms (Teece et al., 2022). Gawer & Cusumano (2008) argue that any firm, regardless of its size, can create a platform by addressing specific business and technological challenges. To achieve this, a firm must consider two strategic options: (1) Coring, which refers to creating a new platform in a previously non-existent market, and (2) Tipping, which refers to gaining market momentum to win platform competition. Besides, Gawer (2014) posits that a firm can transition from an internal platform to a supply-chain platform and eventually to an industry platform by increasing platform openness. However, Thomas et al. (2014) suggest that the evolution of an internal platform to a supply-chain and then to an industry platform is influenced not only by platform openness but also by various leverage logics. They note that a platform can concurrently undergo changes in leverage logic and platform openness. Consequently, they identify three distinct logics of leverage: production, innovation, and transaction (Thomas et al., 2014). Additionally, after analysing the US and European broadcast industry through multiple longitudinal case studies, Pagani (2013) argues that incremental innovations can convert vertically integrated networks into loosely coupled networks, while cross-boundary industry disruptive innovations can transform loosely coupled networks into two-sided markets. Moreover, Hagiu et al. (2020) investigates the strategies a multi-product company can adopt to transition from a multi-product company to a successful industry platform by hosting rival firms. Also, Wichmann et al. (2022) recognized the challenges that brands face when constructing flagship platforms, which are a specific type of industry platforms owned by brands, and developed a comprehensive guide to assist brands in the process of establishing an industry platform.

On the other hand, born-platforms are those platforms that are created by start-up firms (Teece et al., 2022). The majority of the literature have focused on incumbent-born platforms, however there have been limited studies on born-platforms. Through a five-years longitudinal case study of Friendz (Trabucchi & Buganza, 2022a), an Italian two-sided platform, Trabucchi & Buganza (2022) examined the impact of the different actors on the entrepreneurial decisions of platform providers which led to the emergence of the platform. The study outlines a four-step progression that shows how entrepreneurs can start by using an existing platform to launch a new business, then move on to creating their own two-sided platform. The findings of the research emphasize how the different actors of the platform can influence the platform provider's entrepreneurial choices, in terms of value proposition design and the creation of a new industry platform. Also, Cennamo et al. (2022) examined Patient Innovation (Cennamo et al., 2022), which is a prominent platform in Europe that provides user-generated innovative solutions in the healthcare industry, where they argue that applying the generic strategies that are adopted for other industry platforms might be challenging due to the unique characteristics of the healthcare industry. Consequently, in addition to the orchestration activities, Cennamo et al. (2022) identify three roles that a platform owner should play in order to diffuse patient innovation: community organizer, market matchmaker, and innovation manager.

### **3.2 Micro-processes of industry platform integration**

Whether the platform is created by an incumbent firm or a start-up, attracting and integrating the different actors of the market onto the platform is one of the key challenges for the platform owner (Eisenmann et al., 2006). The primary focus of the earlier literature has been centered exclusively on pricing strategies for the purpose of attracting and integrating the different actors on board (Caillaud & Jullien, 2001; Caillaud & Jullien, 2003; Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006; Rochet & Tirole, 2006; Eisenmann et al., 2006; Rysman, 2009). Nevertheless, several authors have contended that pricing strategies are not the sole means of integration, and have examined non-pricing strategies as well (Eisenmann & Hagiu, 2007; Hagiu & Spulber, 2013). Therefore, the industry platform integration process can be categorized into two distinct strategies, namely pricing and non-pricing.

In the context of industry platforms, pricing strategies involve setting the right prices for the different actors in order to incentivize their participation (Eisenmann et al., 2006). The emergence of the industry platform literature can be traced back to the early 2000s when authors began directing their attention toward pricing strategies as a means of enticing the participation of diverse actors (Caillaud & Jullien, 2001; Caillaud & Jullien, 2003; Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006; Rochet & Tirole, 2006; Eisenmann et al., 2006; Rysman, 2009). Caillaud & Jullien (2001) argue that a platform owner can employ cross-subsidization by subsidizing one market segment in order to attract it and enhance their appeal to the other market segment. In a similar vein, Rochet & Tirole (2003) posit that a two-sided market ought to be capable of cross-subsidizing the distinct market actors effectively. Nevertheless, Rochet & Tirole (2003) argue that not only is the value of the price charged to the different market segments consequential, but also the manner in which the price is decomposed; consequently, “A market is two-sided if the platform can affect the volume of transactions by charging more to one side of the market and reducing the price paid by the other side by an equal amount; in other words, the price structure matters, and platforms must design it so as to bring both sides on board” (Rochet & Tirole, 2006: 664). Therefore, the structure of the price is significant (Armstrong, 2006; Rochet & Tirole, 2006; Kaiser & Wright, 2006) and firms should be able to set the right price (Eisenmann et al., 2006).

Although there has been a significant emphasis on pricing strategies, a number of authors have demonstrated that various non-pricing strategies can be employed to effectively engage the different actors of the market. Eisenmann & Hagiu (2007) contend that conventional methods of attracting the various actors of the market, namely pricing strategies, can be both expensive and hazardous. As a result, they have proposed a cost-effective phased strategy for the integration process, the “vendor to two-sided platform” approach, that involves the platform owner acting as a vendor to integrate the first side of the market and then subsequently drawing in the other actors in later phases. Also, Sridhar et al. (2011) underscored the significance of the marketing investments made by platform owners in driving demand among the diverse parties involved; and Hagiu & Spulber (2013) argue that, under specific conditions, first-party content can serve as an integration mechanism to attract sellers. Lately, Fang et al. (2021) investigated the impact of temporary gatherings, which are organized by platform owners, in inducing third-party complementors to join a software platform; Dou & Wu (2021) examined piggybacking, which is defined as “the ability of a platform to connect with an existing user base from a different platform and stage the creation of value units to recruit those users to participate” (Dou & Wu, 2021: 821), as a non-pricing strategy to attract the different actors on board; and Adam et al. (2022) contend that a moderate degree of signalling input control possesses the potential to exert a considerable influence over the expectations of third-party complementors, which, in turn, can affect their decision to join a platform.

### **3.3 Micro-processes of industry platform design**

Baldwin & Woodard (2009) assert that the platform's architecture comprises distinct components, namely, (1) a stable core characterized by a low degree of variety, and (2) a variable periphery with a high degree of variety, while (3) the interfaces are the “specifications and design rules that describe how the platform and modules interact and exchange information” (Tiwana et al., 2010b). Consequently, platform architecture is more concerned with the structural complexity of platforms, whereas governance is more concerned with their behavioural complexities (Constantinides et al., 2018), and exerting control over the interfaces equates to having control over the platform (Baldwin & Woodard, 2009). Based on our review and given the classification of Foerderer et al. (2021), we have further categorized the process of industry platform ecosystem design into hard and soft governance mechanisms.

Hard governance mechanisms influence complementors' behaviour through resource provision and control exertion (Foerderer et al., 2021). Achieving a balance between controlling the behaviour of complementors and maintaining the desired level of generativity poses a significant tension when designing an appropriate governance mechanism (Tilson et al., 2010; Wareham et al., 2014; Eaton et al., 2015). The early literature has contended that boundary resources can facilitate the arm's length relationships between platform owners and third-party complementors (Ghazawneh & Henfridsson,

2013; Eaton et al., 2015; Fink et al., 2020). Boundary resources, e.g., application programming interfaces (Ghazawneh & Henfridsson, 2013), software libraries (Fink et al., 2020), or standardized development tools (Miric et al., 2022), are defined as “the software tools and regulations that serve as the interface for the arm's-length relationship between the platform owner and the application developer” (Ghazawneh & Henfridsson, 2013: 175). Besides, Foerderer et al. (2019) highlight the importance of knowledge boundary resources in accessing and extending the platform's functionality. Additionally, control is perceived as a hard governance mechanism that enables platforms to exercise the option of either opening or closing their platforms (Parker & Van Alstyne, 2018); the entry of a platform into complementary markets is recognized as a hard governance mechanism that enables the coordination of complementors (Foerderer et al., 2018; Young Kang & Suarez, 2022); and agreements and rules, selective promotion, joint problem solving, and socialization are distinct governance mechanisms that enable the platform owner to manage complementary innovation (Jingyao et al., 2022). Moreover, despite being more commonly discussed in the context of innovation platforms, the importance of governance is equally significant in the realm of transaction platforms. For instance, in the context of social media platforms, Reuber & Fischer (2022) examined distinct types of governance mechanisms, namely, those regulating user behaviour, and those concerning user identification and status; and in the context of E-commerce content platforms, Lin et al. (2022) examined the impact of controlling the output through monetary rewards and punishments. Besides, in addition to the previously mentioned tension, Huber et al. (2017) introduced the dyadic governance tension, which considers the trade-off between co-created value and governance costs, as an additional tension that should be considered when designing the appropriate governance mechanism. Consequently, they argue that the governance process is “a process of considerable variation and change in practicing ecosystem-wide rules and values” (Huber et al., 2017: 580).

While most of the literature has focused on hard governance mechanisms, soft governance mechanisms, which influence complementors' behaviour through non-monetary and non-control means (Foerderer et al., 2021), have received less attention in research. To fill this gap, Foerderer et al. (2021) proposed the use of awards as a soft governance mechanism that can effectively influence the behaviour of complementors. Also, soft governance mechanisms were examined in the context of transaction platforms. For instance, in the context of social media platforms, Reuber & Fischer (2022) examined distinct governance mechanisms, namely, those structuring user relationships, e.g., likes or endorsements, and those directing user attention, e.g., hashtags. Additionally, Chan et al. (2022), introduced the concept of strategic design of ratings and reviews and Hukal et al. (2020) introduced the utilization of signalling, opportunity and endorsement signals, as a mechanism for governing the actions of complementors.

### **3.4 Micro-processes of industry platform management**

Managing a platform is a complex task that cannot be accomplished by simply applying strategies that have worked in traditional contexts, as relying on such strategies is often insufficient to ensure success (Eisenmann et al., 2006). Pricing, which was previously discussed as part of the platform integration process, is only one aspect of platform management and is closely intertwined with attracting different actors to the platform (Eisenmann et al., 2006; Hagiu, 2014). In addition to pricing, Eisenmann et al. (2006) argue that platform owners need to manage competition-related challenges; however, the recent literature suggests that non-competition-related challenges also require attention from the platform owner. As a result, the process of managing industry platforms is categorized based on competition-related challenges and non-competition-related challenges.

Challenges related to competition encompass various aspects such as pricing, winner-takes-all scenarios, multi-homing, and envelopment (Eisenmann et al., 2006), among others. Platform owners should cope with the winner-take-all competition, that is, the platform owner should be aware of whether the market can be served by a single platform or not, and whether it should share the platform or try to maintain proprietary rights (Eisenmann et al., 2006). The winner-take-all topic was discussed by several scholars, including Doganoglu & Wright (2006), Armstrong & Wright (2007), Doganoglu & Wright (2010), Cennamo & Santalo (2013), Belleflamme & Peitz (2019), and Wiegand et al. (2022), among others; however, some authors have challenged the winner-take-all hypothesis in

the context of industry platforms, including, Anderson et al. (2014) and Huotari et al. (2017). Besides, one of the conditions that make the winner-takes-all situation arise is the height of the multihoming costs (Eisenmann et al., 2006). Unlike the early literature which examined multihoming in the absence of exclusive contracts (Rochet & Tirole, 2003; Caillaud & Jullien, 2003; Armstrong, 2006; Doganoglu & Wright, 2006), Armstrong & Wright (2007) argue that introducing exclusive contracts play a major role in preventing multihoming on the seller's side of the market. Nevertheless, the effectiveness of exclusive contracts in preventing multihoming was challenged later on by Doganoglu & Wright (2010). Additionally, platform owners should avoid envelopment, where other companies leverage overlapping user bases to enter a different market (Eisenmann et al., 2006). Nevertheless, winner-take-all, envelopment, and multihoming (Belleflamme & Peitz, 2019; Park et al., 2021; Wiegand et al., 2022) are not the only challenges that should be managed by the platform owner. Platform owners face a range of challenges, including responding to market entries (Cozzolino et al., 2021), executing effective market entry strategies (Eisenmann et al., 2011; Barile et al., 2022; Ozalp et al., 2022), managing disruptive innovation (Ansari et al., 2016), dealing with cyberattacks (Sen et al., 2020), and developing internationalization strategies (Stallkamp & Schotter, 2021). Besides, the relationship between different platforms is not always competitive and can involve collaborations (Zhu et al., 2021) or synergies (Wu et al., 2022).

Alternatively, non-competition-related challenges refer to issues that a platform owner must address, but which are not directly linked to competition, including, digital piracy, hiring, and data strategies, just to mention a few. Miric & Jeppesen (2020) posit that the unauthorized duplication and distribution of digital products, that is, digital piracy, poses a significant strategic challenge due to the potential loss of income and the perceived negative impact on innovation; Ge et al. (2020) examined the impact of hiring skilled workers, from firms with high platform human capital, on the financial performance of a recipient software platform; Bhargava et al. (2020) highlighted the dearth of research on data strategy in platform contexts, wherein the specific strategy employed to handle data collection, storage, sharing, access, and monetization varies based on the type of platform and its business context; Broekhuizen et al. (2021) suggested a non-actor based approach for making openness decisions, where the platform owner decides which product categories and channels to open up; and Garud et al. (2022) analyzed how firms can attain cognitive and socio-political legitimacy by utilizing both market and non-market strategies, specifically by leveraging liminal movement.

### **3.5 Micro-processes of industry platform evolution**

Numerous studies have identified platform architecture and governance as critical factors that drive platform evolution (Modol & Eaton, 2021). Thomas et al. (2022) argue that the early governance decisions of a platform play a crucial role in shaping the platform's evolution and its associated ecosystems. While the platform owner bears the primary responsibility for designing and altering the architecture of digital ecosystems, the evolution of platforms goes beyond this (Helfat & Raubitschek, 2018). For instance, platforms must continuously innovate and adapt their business models to the changing competitive landscape (Helfat & Raubitschek, 2018) to remain competitive as markets and technologies continue to evolve (Gawer & Cusumano, 2014a). Consequently, the process of platform evolution can be classified into two distinct categories, architecture-related evolution and function-related evolution.

Architecture-related evolution is driven by changes in platform architecture, governance, and control mechanisms. Architectural control is seen as significant by scholars as it enables platform owners to shape the platform's evolution and direction. Baldwin & Woodard (2009) argue that having control over the interfaces of a platform is tantamount to having control over the platform itself and its evolution. Tiwana et al. (2010) argue that platform evolution is not only influenced by its architecture, but also by the coevolution of governance, environmental dynamics, and architecture. Additionally, Gawer & Cusumano (2014) argue that platform owners use architectural control to maintain or increase competition among third-party complementors and thereby drive the platform's evolution towards a leadership position. Besides, after developing the boundary resources model, Ghazawneh & Henfridsson (2013) utilized the boundary resources model to analyze the evolution of Apple's iPhone platform and identified four distinct stages of evolution: (1) self-resourcing: when

third-party developers create new resources to overcome limitations caused by excessive platform governance, (2) regulated securing: when platform owners control their platform through administrative legislation instead of technical restrictions, (3) diversity resourcing: when platform owners diversify their platform through third-party development to transform their enterprise and stimulate new application areas, and (4) sovereignty securing: when a platform owner takes actions to control the evolution of the platform. Besides, in the initial phases of platform evolution, platform owners tend to adopt broad governance mechanisms and maintain an arm's length relationship with third-party complementors; however, as the platform matures, platform owners tend to move beyond these broad rules and establish partnerships with appealing complementors (Huber et al., 2017).

On the other hand, function-related evolution is related to the evolution driven by changes in platform's functionality and value propositions. Zhao & Chen (2019) argue that the process of evolution from a two-sided platform to a multi-sided one is primarily fueled by business model innovation and imitation. Nevertheless, sustaining a leadership position necessitates ongoing innovation and redesign of the business model, which, in turn, calls for the development of three dynamic capabilities: innovative capabilities, environmental scanning and sensing capabilities, and integrative capabilities for ecosystem orchestration (Helfat & Raubitschek, 2018). Besides, Tan et al. (2015) proposed four development strategies: encapsulating, delegating, meshing, and empowering. While they acknowledged the relevance of the coring and tipping strategies, which were introduced by Gawer & Cusumano (2008) and previously discussed in the platform creation process, they argue that these strategies are only relevant during the nascent stage of platform development. Consequently, encapsulating and delegating strategies are relevant in the formative stage, while meshing and empowering strategies are relevant in the mature stage of platform development (Tan et al., 2015). Likewise, Au et al. (2020) argue that there are unique strategies and outcomes associated with each evolutionary stage. However, they classified the evolution of peer-to-peer lending platforms into three distinct stages, with each stage focusing on the development of a specific actor, such as partners, lenders, and borrowers.

#### **4. FUTURE RESEARCH AGENDA**

Based on the systematic literature review, we classified the studies into five key processes: creation, integration, design, management, and evolution. Our analysis has shown that a significant portion of the literature concentrates on specific micro-processes, while others have not received adequate attention. Despite the extensive efforts invested in researching industry platforms, this field is still evolving. As a result, a comprehensive understanding of the subject is yet to be achieved, with certain aspects still underexplored or in their early stages of development. As previously mentioned, the industry platforms literature has been influenced by the two-sided markets literature (Caillaud & Jullien, 2001; Caillaud & Jullien, 2003; Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006; Rochet & Tirole, 2006; Eisenmann et al., 2006; Rysman, 2009), which has long examined pricing matters. Consequently, pricing has been a primary focus of research regarding industry platforms, as it is a critical tool to attract market participants and compete with rivals (Eisenmann et al., 2006). Nonetheless, our comprehension of non-pricing methods for attracting various actors is still inadequate, despite the considerable efforts devoted to this area of study, including, (Eisenmann & Hagi, 2007), (Amelio & Jullien, 2012), (Sridhar et al., 2011), (Hagi & Spulber, 2013), (Fang et al., 2021), (Dou & Wu, 2021), and (Adam et al., 2022). Thus, it is evident that the initial literature focused mainly on the integration and management processes, with a particular emphasis on pricing. However, this approach led to a relative neglect of the issue of how these platforms are created (D. McIntyre et al., 2021). Thus, the creation of industry platforms remains an area that requires further investigation. We have yet to fully understand the creation of both incumbent-born and born-platforms, as well as their antecedents and determinants. Furthermore, the majority of the literature has focused on attracting various actors to the platform. However, the issue of how many sides a platform should have and how the platform owner can make such a decision, including the antecedents and determinants involved, remains relatively understudied.



Additionally, since Tilson et al. (2010), Yoo et al. (2010), and Tiwana et al. (2010) shed light on the lack of attention given by Information Systems (IS) scholars to platforms, numerous studies have addressed this subject. However, the majority of these studies have primarily focused on governance mechanisms in innovation platforms (Ghazawneh & Henfridsson, 2013; Eaton et al., 2015; Fink et al., 2020), neglecting the importance of governance in transaction platforms, with the exception of (Hukal et al., 2020), (Reuber & Fischer, 2022), (Lin et al., 2022), and (Chan et al., 2022), just to mention a few. Hence, further exploration is required to gain a better understanding of governance in the realm of transaction platforms. Furthermore, most studies on the design process have primarily emphasized hard governance mechanisms (Ghazawneh & Henfridsson, 2013; Parker & Van Alstyne, 2018; Foerderer et al., 2019), with little consideration given to soft governance mechanisms until the recent study by Foerderer et al. (2021). As a result, our understanding of soft governance mechanisms remains limited. Moreover, most studies on the management process have primarily concentrated on competition-related issues (Eisenmann et al., 2006; Armstrong & Wright, 2007; Doganoglu & Wright, 2010; Cennamo & Santalo, 2013; Belleflamme & Peitz, 2019; Wiegand et al., 2022), specifically price competition with other competitors (Rochet & Tirole, 2003; Parker & Van Alstyne, 2005; Armstrong, 2006; Rysman, 2009). However, there are also non-competition related issues that platforms must manage. Therefore, there is a need to explore non-competition related managerial issues, such as human resource management (Ge et al., 2020) and data management (Bhargava et al., 2020).

Also, just like the creation process, the evolution of industry platforms is often overlooked. Most studies attribute the evolution of these platforms to their architectural structure (Gawer & Cusumano, 2014; Tiwana et al., 2010; Ghazawneh & Henfridsson, 2013; Thomas et al., 2014). However, some authors have explored other aspects of platform evolution beyond its architecture, including, (Gawer & Cusumano, 2014a), (Muzellec et al., 2015), and (Zhao & Chen, 2019). Therefore, we currently have limited understanding of how industry platforms evolve and transform over time, given that the antecedents and outcomes of the evolution process are still uncertain. Therefore, to bridge this knowledge gap, it is crucial to conduct research not only on the creation of industry platforms but also on their evolution. Besides, the five processes we discussed are not necessarily sequential, and platform owners should address them concurrently due to the dynamic nature of platforms. Consequently, there is a need to examine the interplay among processes, micro-processes, and the relationship between them.

While the majority of work on industry platforms is conducted through conceptual and stylized analytic models (Sriram et al., 2015), there is a pressing need for more empirical research, particularly longitudinal studies, to deepen our understanding of the creation and evolution processes. While studies focusing on a snapshot of time have provided valuable insights into various platform processes, relying solely on such studies may limit our comprehension of other critical processes. Besides, most studies on industry platforms have focused on B2C and C2C contexts, leaving a significant gap in our understanding of B2B industry platforms, with the exception of (Loux et al., 2020), (Jovanovic et al., 2021), and (Shree et al., 2021), just to mention a few. This lack of research has resulted in limited knowledge about B2B industry platforms and the processes involved. Thus, conducting a systematic literature review on industry platforms in a B2B context would be highly valuable in filling this gap and enhancing our understanding of these platforms and their processes. Additionally, recent studies suggest that certain industries such as healthcare and education are subject to higher levels of regulation (Ozalp et al., 2022), setting them apart from other industries like payment cards and game consoles that were previously examined in discussions of industry platforms. Given these differences, it would be insightful to explore how the processes that industry platform owners undergo vary between highly regulated industries and the more typical industries commonly discussed in literature. Finally, it is important to note that this review focused solely on the perspective of the platform owner, who is only one piece of the larger puzzle that constitutes the platform and its corresponding ecosystem (Van Alstyne et al., 2016a). To gain a more comprehensive understanding of industry platforms, it is essential to conduct similar studies from the perspectives of the various actors within the ecosystem. Conducting such studies can make a substantial contribution towards enhancing our understanding and creating a holistic view of industry platforms and their ecosystems.

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