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Conceptualization of research themes and directions in business ecosystem strategies: a systematic literature review

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Abstract
Motivated by the rapid advancements in the field of business ecosystems (BEs), this paper presents a holistic overview of existing research in the field of business ecosystem strategy. As scholars have noted, BE strategy poses new challenges and diverges from traditional thinking in multiple ways. Researchers have investigated parts of strategy in that regard; however, a holistic approach to BE strategy does not exist. To this end, this study relies on a systematic literature review approach and analyzes contributions from across disciplines in an attempt to derive a holistic ecosystem strategy framework. The study identifies six main elements that reflect strategic considerations along subsequent stages of decision-making. It then discusses the fifteen sub-streams identified in the literature, placing them in their strategic context. Based on this analysis, gaps in the literature and future research opportunities are identified. This study is motivated by the aspiration to make the topic of ecosystem strategies more accessible for scholars and practitioners, while enabling a broader discussion based on the current state of research.

Keywords Business ecosystem strategy · Platform strategy · Ecosystem competition · Competitive dynamics · Competitive strategy · Systematic literature review · Strategic framework · Research directions

JEL Classification M100 · L100 · L210 · L220

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Abbreviations
BE Business ecosystem
FE Framework element

1 Introduction

Over the past few decades, the concept of business ecosystems (BEs) has increased in prominence from both practical and theoretical perspectives. BEs have recently permeated the global economy, with their services and products affecting billions of people directly (Evans and Schmalensee 2016). As more than half of the world's leading companies are operating an ecosystem model to some extent (Pidun et al. 2022), understanding the strategy dynamics of this ecosystem economy has become imperative for businesses.

Introduced by Hawley (1986) in a social science context, the term 'ecosystem' was first applied by Moore (1993) in the field of business strategy, suggesting that firms should be most suitably seen as members of an ecosystem spanning beyond industry borders. Although many synonyms[1] and definitions emphasize different aspects of ecosystems, authors generally describe them as communities of actors congregating around a common value proposition (Adner 2017). The collaborative aspect enables value creation exceeding each participant's individual capacity (Boudreau 2012; Jacobides et al. 2018; Kapoor 2018).

Defining an ecosystem around a particular value proposition differentiates BEs from related approaches: an ecosystem may overlap with but stretch beyond the traditional organizational network (Ghoshal and Bartlett 1990) of a single firm or a regional cluster of firms (Porter 1990). Equally, ecosystems diverge from traditional organizational models, as they are neither integrated hierarchies nor fit into classical firm-supplier relationships, such as Porter's (1980) value system of traditional strategic management. In contrast, the differing characteristics of ecosystems require viewing them through different lenses. Birkinshaw (2019) suggests that the essence of competitive advantage has changed resulting in profound implications for business strategy.

With business ecosystems permeating the global economy, *ecosystem strategy* considers how actors partaking in BEs can navigate this novel environment and develop their competitive strategy effectively.

Competitive strategy in its purest form describes how a firm competes within its environment, defining how it creates and sustains its competitive advantage (Bertelè and Chiesa 2001). Porter (2001) suggests that business ecosystem competition relies on the proven principles of effective strategy, but Cennamo (2019) argues that

[1] Multiple synonyms exist and include: **two-sided markets**, e.g., Armstrong (2006); Rochet and Tirole (2003), **multi-sided markets**, e.g., Eisenmann et al. (2006), **meta-organizations**, e.g., Kretschmer et al. (2022), **digital & software platforms**, e.g., Boudreau (2010), or **business, innovation or transaction ecosystems**, e.g., Adner and Kapoor (2010); Gawer (2021).

ecosystem competition may have altered the vital assumptions on which these principles were based.

When firms used to compete based on their internal competitive advantage, business strategy determined the actions for individual businesses or units, and corporate strategy combined individual business strategies setting the overarching course of action for the whole firm. Conversely, *ecosystem strategy* stretches beyond the firm and relates to all actors partaking in a particular ecosystem. Not only is it essential to investigate this type of strategy as competition is now occurring on the ecosystem level (Cennamo 2019), but multiple factors suggest that ecosystem strategies also diverge from traditional approaches.

First, competing in the context of ecosystems poses new challenges; BEs must bring together two or more distinct participant groups (McIntyre et al. 2021a) and manage the process of co-creation of value, including inherent risks such as the dependency on others and their ability to match innovation quality and speed (Adner 2006). Eisenmann et al. (2006) visualize these new challenges by comparing ecosystem strategy to playing 'three-dimensional chess'. Additionally, Reeves et al. (2019) observe that the long-term success rate of ecosystem businesses is estimated to be below 15%, implying that firms fundamentally differ in implementing successful strategies. With new challenges evident, many questions remain open in the field of ecosystem strategy.

Second, bound by neither hierarchical structures nor arm's-length relationships (Rietveld et al. 2019), actors voluntarily cooperate to enable a value proposition while simultaneously pursuing their economic self-interest by capturing value. When Moore (1993) called for an extension of the systematic approach to strategy, he underlined that the process of co-evolution observed in BEs provides a complex interplay between competitive and cooperative business strategies. This setting, in which firms collaborate and compete simultaneously, was dubbed coopetition (Brandenburger and Nalebuff 1996) and bears the potential to erode much of the rationale from traditional decision-making processes.

Third, BEs must extend the unit of analysis beyond a single firm or market to the entire ecosystem (Teece 2014). In traditional contexts, firms compete in given and defined markets, with strategies aimed at capturing a larger share of the total value available in the market by acting and re-acting toward rival firms (Cennamo 2019). However, BEs focus on value creation by enabling a particular value proposition; as such, BEs may influence the size of their market in an attempt to increase value creation for participants (Panico and Cennamo 2015). Ecosystems may thus exhibit strategic patterns that have not been previously seen and may contradict the behavior typically observed in traditional settings.

The ecosystem label has been used in various contexts because of its usefulness for describing the complex and interconnected set of actors for which strategy is formulated. Where Gawer (2021) emphasizes platforms[2] as main enablers for a broader ecosystem and a ground on which to base complementary products or services,

[2] For a discussion of the development of the platform concept, see Gawer and Cusumano (2014).

Daymond et al. (2022) discuss a continuum of different ecosystem types.[3] The authors agree that strategy is formulated in an empirical context where "different types of ecosystems […] overlap, intersect, and interpenetrate one another to varying degrees" (Daymond et al. 2022, p. 3). Assuming that insights drawn from one ecosystem type may provide transferable insights for another, we take into account different ecosystem types in this study.

Driven by contributions across academic areas, the explosive growth in research has led to different clusters of topic interest that yet lack a coherent framework. Authors have described and analyzed phenomena from different perspectives, ranging from particular mechanisms in price setting to meta-level analyses of how competition between platforms unfolds. Similarly, varying use of nomenclature across research efforts has hindered the bridging of different perspectives. With existing strategic decision-making frameworks stretched to their limits, there is currently no alternative in the literature covering *ecosystem strategy* in its entirety. Existing reviews in the field have been published in renowned journals (Jullien and Sand-Zantman 2021; McIntyre and Srinivasan 2017; Rietveld and Schilling 2021). But while some have addressed particular elements of strategy or mentioned how different schools of disciplines view platform competition and strategy, none have explored the field of ecosystem strategy holistically. This presents ample space for further exploration.

Consequently, this study aims to conduct a systematic literature review across disciplines, providing three contributions. First, the broad ecosystem strategy literature will be sorted alongside conceptual themes to make it more accessible. Second, a framework will be developed to provide a holistic overview and classify all ecosystem strategy elements from an individual actor's perspective. Finally, the identification and discussion of future research directions will provide a sound basis for expanding the field.

The remainder of this paper is structured as follows. Section 2 outlines the review methodology and gives an overview of existing research. Section 3 presents the main results and leads to Sect. 4 that discusses future research directions. Section 5 concludes the paper.

2 Literature review

2.1 Methodology

This study relies on a systematic literature review approach to gain deep and comprehensive insights into the current state of ecosystem strategy research. The

[3] Daymond et al. (2022) describe (i) **entrepreneurial ecosystems** as sector and technology-agnostic systems co-locating to support the creation and growth of ventures. In contrast, the output of products or services can be achieved through (ii) **business ecosystems**, focusing on a focal firm and its environment, (iii) **innovation ecosystems**, addressing the constellation of actors around novel technologies and value propositions, or (iv) **platform ecosystems** focusing on how actors congregate around a 'platform' technology.

insights were gathered and presented using an explicit and reproducible method, relying on the five-stage process (Fig. 4, Appendix) of Denyer and Tranfield (2009) and Webster and Watson (2002).

This review is motivated by two research questions:

RQ1: How can actors in BEs develop their *ecosystem strategy*?

RQ2: What are the main themes in the extant ecosystem strategy literature, and how can they be organized in a holistic *business ecosystem strategy framework*?

Consistent with previous reviews in the field (Rietveld and Schilling 2021), we conducted a Boolean search query relying on multiple criteria to guarantee a structured and systematic approach for identifying relevant articles. We captured further articles through forward and backward snowballing as a subsequent step. The study location (Table 2) and process steps (Table 3) are presented in the Appendix.

By searching three online databases, a total of 4,053 articles was retrieved, of which 2,338 remained after excluding duplicates. With the terms *'platform'* and *'ecosystem'* being homonyms,[4] we encountered noise in the results and accordingly manually screened all articles for relevance in a stepwise fashion. We screened each article's title, abstract, and introduction, such that studies outside of the subject area were excluded in each iteration. This process left 433 contributions as a basis for deeper content analysis and the development of a holistic ecosystem strategy framework. Four articles were added through backward and forward snowball sampling.

The articles were analyzed by applying the grounded theory approach initially suggested by Glaser and Strauss (1967) and later advanced for application (Corbin and Strauss 1990; Goulding 2002). The approach aims to allow "key concepts to surface instead of being deductively derived beforehand" (Wolfswinkel et al. 2013, p. 46), which is especially suitable when the researched field is still developing and no conventionally used terms have been established, such as in the field of BEs. Without deductively deriving strategic buckets beforehand, this approach allowed us to observe which strategic questions had been addressed in the literature and to recombine them along common themes. We applied open, axial, and selective coding (Wolfswinkel et al. 2013) to identify all concepts and conceptualize a framework that presents evident themes within the ecosystem strategy literature.

Accordingly, a sample of 437 papers was coded systematically. Using an iterative approach, we identified 151 concepts in the first coding step, ranging from "product pricing", "pricing strategies" and "subsidization pricing" over "network effects", "platform value" and "market dominance" to "control", "openness", "governance" and "generativity". We then developed axial codes across these concepts by grouping them under strategic questions that each of these concepts addressed and arrived at 30 axial codes. Examples include questions such as "how do you discover ecosystem opportunities?", "how do you compete based on pricing?", or "how do you evolve your ecosystem over time?". In the last step of selective coding, we reconceptualized the data based on two aspects: Firstly, we addressed these questions from an individual actor's point of view, attributing perspective to the axial codes. Secondly, we noticed a temporal aspect within the questions and thus arranged the topics in the logical order of subsequent decision-making stages that an actor encountering

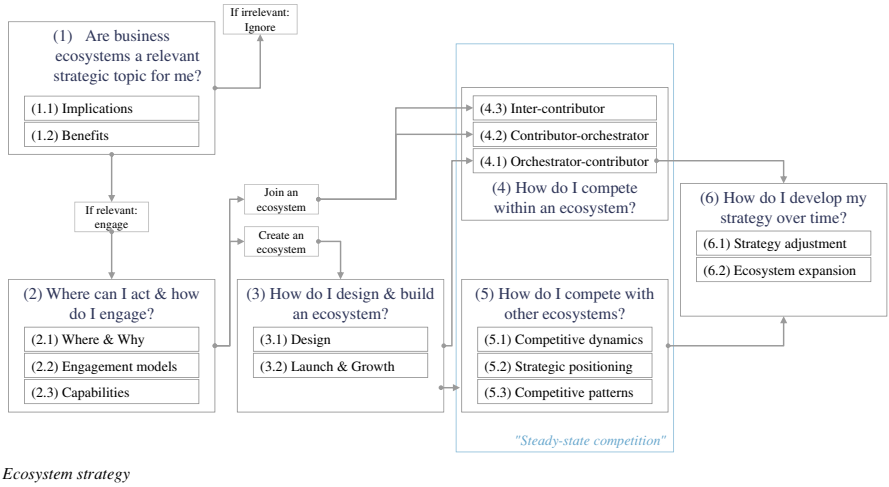

Fig. 1 *Ecosysystem strategy* framework

BEs would pass through. In doing so, we were able to aggregate axial codes further and arrived at the final six selective codes representing the first layer of the deduced framework presented in Fig. 1.

The strategic framework deviates from commonly known forms as it provides an overview of the literature and additionally reflects the processual view of a particular actor engaging in BEs; depicting the actor's holistic process allows us to identify gaps in the literature.

For the content discussion in this review, we further prioritized articles with a focus on relevance. Relevance was decided based on each contribution's decisiveness and novelty and was guided by the journal quality criteria. To verify our selection, we applied a four-eye principle. All results were captured in a concept-mapping matrix that assigned relevant themes to each article (Table 4, Appendix).

2.2 Overview of existing research

Ecosystem strategy research has seen an equal growth dynamic compared to the overall field of BEs – the number of articles has consistently increased in recent years, with more than half (~51%) of the contributions published in or after 2019. The width of the journals (~209) reflects that ecosystems have become a relevant topic across academic areas. The literature body is dominated by the field of business (~36%), followed by economics/econometrics (~12%), computer science (~13%), and the decision sciences (~12%). Additionally, new subject areas, such as energy, environmental science, and engineering have appeared more consistently over time. Although this shows that BEs are genuinely seen as an interdisciplinary

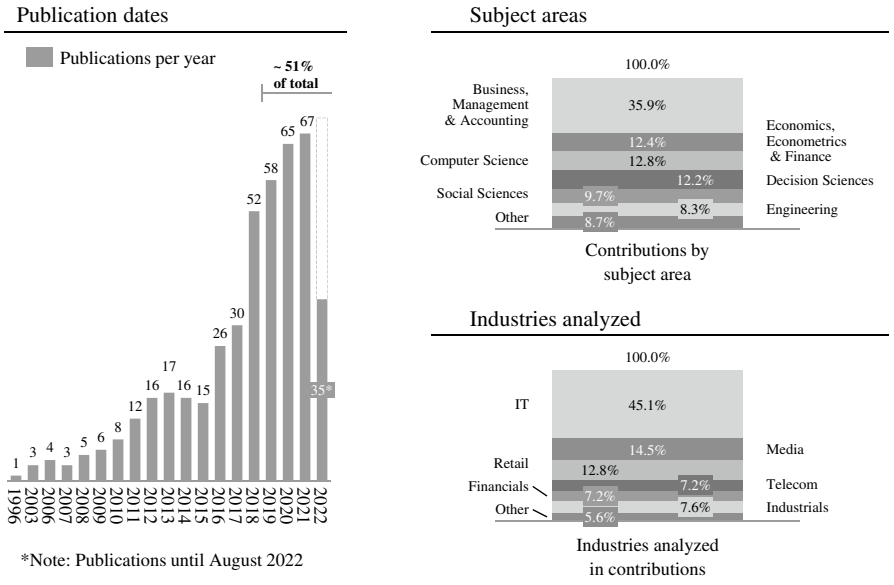

Fig. 2 Descriptive statistics of the literature body

topic, approaching the same field from various angles suggests that existing research has emphasized different aspects and questions regarding ecosystems.[4]

Regarding the methodologies applied, the field constitutes empirical (~35%) and theoretical (~28%) approaches, with the remainder including verbal conceptualization (~18%). Empirical research is driven by single case studies (~24%), multiple case studies (~37%), and regression analyses (~9%). Theoretical research mainly constitutes formal models (~94%) and theoretical simulations (~6%), mainly from the field of economics. The high share of case studies suggests that the research area is still emergent; using Ridder's (2017) denotation, concepts are developing and tentative theories are being tested.

Approximately 46% of the research was conducted without industry focus, driven by theoretical models, with the remaining contributions focusing on one or more particular industries.[5] The main emphasis was on technology-based industries,[6] with the IT sector, media, and telecommunications making up combined contributions

[4] As such, certain fields show a clear focus on particular formulations of research questions; the economics literature, for example, despite its considerable share in overall contributions (e.g., Bakos and Halaburda 2020; Halaburda et al. 2018; Jeitschko and Tremblay 2020), has focused on the very specific topics around solving competitive equilibria in the ecosystem context.

[5] Based on *Global Industry Classification Standard (GICS).*

[6] The heavy focus on tech-based industries is likely driven by firstly the connection to the information science field of networks that has partially influenced ecosystem literature, and secondly by the tendency of technology settings to provide relatively high ease of scalability, realization of network effects and data availability.

of ~ 67%. However, more recent research has expanded to include other industries, such as retail, finance, and industrials (Fig. 2).

The combination of an interdisciplinary research effort and a high share of exploratory research designs implies that the field of ecosystem strategy is emergent and not yet at the point where researchers can test comparable hypotheses on a broader basis. Additionally, the spread of contributions across multiple industries, or without a clear industry focus, exacerbates the effort to make the results comparable.

3 Results

The strategic framework was derived based on the last iteration of the discussed coding technique (Fig. 1). While the grounded theory approach allowed us to identify the questions addressed in the literature, we took the perspective of an actor encountering BEs to arrange the questions along the key stages of strategic decision-making. The resulting process-related framework is suited to summarize existing research and to build first hypotheses on possible research gaps, which are further validated in the discussion of future research directions (see Sect. 4).

First, an actor confronted with BEs must decide whether they are a relevant strategic topic for the firm (FE-1), based on potential implications and benefits. If the actor concludes that BEs are relevant, it must identify opportunities and ways to engage (FE-2). It can either join an existing ecosystem as a contributor or create and orchestrate its own ecosystem. As a contributor, the actor needs to develop strategies for competing within the ecosystem, with other contributors and with the orchestrator (FE-4). As an orchestrator, the actor needs to design and successfully launch its ecosystem (FE-3) and develop strategies for within-ecosystem competition (FE-4) as well as between-ecosystem competition (FE-5). Finally, the orchestrator must adjust its ecosystem strategy over time and identify opportunities for ecosystem expansion (FE-6).

This framework captures all relevant themes in the literature. However, some terms and concepts from the literature are relevant at multiple stages of decision making, and they will be discussed in the context of the respective elements of the framework. A glossary mapping in the Appendix (Table 5) classifies all concepts to allow easier access to the reader.

3.1 Framework element (FE) (1): Are business ecosystems a relevant strategic topic for me?

Cennamo (2019) suggests that competition as a whole has moved from company to platform level, indicating the relevance of BEs to all entities participating in competition. With the opening of the business environment to a global scale, asset ownership may no longer drive sustainable competitive advantage (Teece 2007) such that traditional competition logic seems invalid. Rather, organizations will be challenged in their institutional logic (Altman and Tushman 2017) and must learn to transform their resources and capabilities and adjust organizational processes correspondingly

(Cha 2020). While the question of strategic relevance of business ecosystems has not been in research focus so far, two streams can be identified in the literature.

The first stream discusses possible *implications (FE-1.1)* of BEs for strategic decisions. The blurring of boundaries is seen as an irreversible process in which traditional firms struggle to compete as success moves along the new forms of product development and organizational forms (Teece 2007). Continued formulation of competitive strategy hinges on adapting to 'ecosystem thinking' (Adner 2017), including the management of contributing actors. Incumbents may not be able to ignore BEs because the emergence of platforms has the potential to severely disrupt their revenue models (Kretschmer et al. 2022). This is increasingly so as more industries progressively have the potential to develop platform business models (Beverungen et al. 2021). While Iyer et al. (2007) argue that incumbents can monitor certain signposts (e.g., shift from vertical integration toward horizontal interconnectedness, manifestation of standards, or platform norms), they often lack the capability to build entry barriers toward ecosystem entrants (Cozzolino et al. 2021). Firms will thus face a choice to fight or accommodate BE entrants. Early research shows that most incumbents tend to converge from cooperation and competition to selective coopetition scenarios, where they collaborate with BE entrants to create value while competing to capture value (ibid.).

The second stream of literature investigates *benefits (FE-1.2)* of BEs and their potential advantages. In their basic form, ecosystems bear the potential to foster innovation through external companies (Pellizzoni et al. 2018). One distinctive advantage over other organizational forms is the BE's ability to contain and coordinate production and consumption complementarities without the need for vertical integration (Cennamo et al. 2020; Jacobides et al. 2018). As such, BEs provide a suitable vehicle to address the processes of industry renewal or high uncertainty through targeted innovation (Rong et al. 2013b) and can help solve challenges that require orchestrated innovation, such as the sharing economy (Chen et al. 2019). However, in addition to innovation benefits, BEs can also aid firms with more traditional challenges, such as internationalization. Jin and Hurd (2018) show that platforms may ease trust issues when entering new markets, thus providing a reliable internationalization channel for both platform owners and contributors.

3.2 FE (2): where can I act & how do I engage?

Actors that identify BEs as a relevant strategic topic must address multiple questions before they can actively engage. Three research streams can be found in the extant literature that address *where and why (FE-2.1)* opportunities arise, how possible *engagement models (FE-2.2)* could look like, and which *capabilities (FE-2.3)* are required to succeed in BEs.

Although the literature mentions the potential benefits of ecosystems (see 3.1.1), there is only limited research addressing where and why (FE-2.1) ecosystem opportunities can be found. Hannah and Eisenhardt (2018) identified industry bottlenecks as prime locations around which BEs can form; however, this also holds for traditional organizational forms. According to Kenney and Pon (2011), ecosystems can

find grip when there is a need for coordination of multiple actors, such as in times of industry convergence or technical discontinuities. This also holds for established industries, in which the ecosystem may prove a utile model to provide coordination (Rong, Shi, Yu 2013).

When an ecosystem opportunity has been identified, the next question is how best to engage (FE-2.2). Khanagha et al. (2022) show that incumbents threatened by a BE entering their domain respond by either joining the competing ecosystem to participate in value capture or by creating a platform themselves, suggesting that there are different engagement models driven by the choice of role. Authors generally differentiate between leading an ecosystem and following the leader by contributing to its offering (Iansiti and Levien 2004; Kamalaldin et al. 2021).[7] In general, the academic literature has convened to the terms of an orchestrator or platform owner who orchestrates various contributors[8] around a focal value proposition (Adner 2017; Khanagha et al. 2022).

Assuming the role of ecosystem contributor inhibits the ability to capture maximal value from the ecosystem compared to platform leaders, but simultaneously limits the risks and responsibilities associated with operating within an ecosystem (Khanagha et al. 2022). However, while actors must decide on the role they will assume in a given ecosystem, they are not confined to one BE; instead, they can engage in multiple BEs and adjust their engagement models accordingly (Bosch-Sijtsema and Bosch 2015; Tukiainen et al. 2019). Pellizzoni et al. (2018) found that being an ecosystem leader is no longer imperative, as firms gain additional value from different roles in multiple ecosystems.

An emerging stream of literature investigates which specific capabilities are required to compete in business ecosystems (FE-2.3). Teece (2007) leverages the concept of *dynamic capabilities* to suggest that firms can only address ecosystem opportunities if they change their management to an entrepreneurial form and reshape their organizational structures to be dynamic. Engaging in ecosystems results in different organizational challenges, such as dealing with more complex relationships in two-sided markets and changing demands from value creation to value co-creation (Beverungen et al. 2021). Similarly, Altman and Tushman (2017) argue that increased external focus, greater boundary openness, and a newly developed emphasis on enabling transactions and adopting interaction-centric metrics will require all (ecosystem) firms to adapt their organizational capabilities.

[7] According to Kamalaldin et al. (2021), the differentiation between the leadership roles of orchestrator or dominator depends on the degree to which leadership is executed through orchestration versus forced implementation of the leader's infrastructure. Similarly, the follower can assume a more cooperative complementor approach or a protector role whereby the contributor's information remains heavily guarded.

[8] The literature uses different terms for the contributor role such as: *complementor*, *partner*, *third-party, innovator*.

3.3 FE (3): How do I design & build an ecosystem?

Some actors decide to build their own business ecosystem. Khanagha et al. (2022) highlight that platform creation can be a competitive response to platform entry; incumbents can initially contribute their product to an entrant's platform before creating their own ecosystem. Similarly, firms can turn their traditional business models into platforms by hosting rival products, that is, effectively becoming a marketplace and monitoring rival transactions (Hagiu et al. 2020). In a case study of a software platform, Saarikko et al. (2019) find that successful platform creation is less dependent on *ex-ante* strategies and more driven by awareness of choices in the respective ecosystem context. Two streams are visible in the literature, focusing on *design (FE-3.1)* and *launch and growth (FE-3.2)*.

Ecosystem design (FE-3.1) relates to the choices in the initial planning phase of the ecosystem, describing how the BE provides value to users and defining roles and rules. With increasing competitive intensity, ecosystem design is becoming an increasingly important driver of business success (Jacobides et al. 2018). Major design decisions include the number of participant groups, the exact features to include in the value proposition, the value appropriation mechanism through pricing, and the initial governance model (Hagiu 2013), the primary purpose of which is to spur the ecosystem's innovativeness by inviting contributing partners while maintaining control.

Authors recognize the early ecosystem governance model as an effective tool to control participant behavior without excessively constraining generativity[9] (Wareham et al. 2013). Despite acknowledging the importance of this design choice for inviting participants to the ecosystem, the different nomenclatures[10] used in the literature (Kretschmer et al. 2022; Kyprianou 2018; Wareham et al. 2013) suggest that there is no all-encompassing best practice for the architectural tools used (Boudreau 2010). This may also be caused by the observation that design choices are generally industry-dependent (Casadesus-Masanell and Campbell 2019) and should be viewed as part of a dynamic process that evolves alongside the requirements of the business model (Wallin 2012). However, linking ecosystem performance to design choices is not straightforward, as the (design) responses of contributors to the design choices of the orchestrator must be accounted for (Brunswicker et al. 2019).

Apart from general design principles, a second stream of literature (FE-3.2) explores how ecosystems can be successfully launched and commercialized. The general trade-off between growth and profitability also pertains to ecosystems (Bhargava et al. 2013), where the *chicken-and-egg* problem (Karhu et al. 2020; Rochet and Tirole 2003; Stummer et al. 2018) describes the initial challenge for orchestrators to bring on contributors and users to the ecosystem. As long as network effects – the benefits that users derive from the presence of other contributors – do not yet exist,

[9] The author relies on the definition of Tilson et al. (2010) describing *generativity* as the ability of a self-contained system to generate or produce new output without any input from the originator of the system.

[10] Terms used include inclusion/exclusion and autonomy/monitoring by Kyprianou (2018), openness/closedness by Wareham et al. (2013) and centralization/decentralization by Kretschmer et al. (2022).

the perks for contributors are limited. Wallbach et al. (2019) identified the presence of network effects as the main driver behind ecosystem diffusion.

Until network effects unfold, however, the ecosystem orchestrator incurs costs to attract participants and faces risks of failure in doing so. To limit these initial costs and risks, four main strategic patterns have been observed: (a) core user markets, (b) staging, (c) first-party content, and (d) subsidization.

First, an early-stage ecosystem may initially focus exclusively on *core users* (Kim 2018) or a selected market area to test the value proposition and related contributor participation (Bhargava et al. 2013) before committing to further expansion (Stummer et al. 2018). Staykova and Damsgaard (2015) found that successful ecosystem growth depends on a platform's ability to carefully manage its user reach and range of functionalities.

Second, *platform staging* was observed on successful platforms (Staykova and Damsgaard 2016). It describes the approach when a platform starts with one element of the ecosystem to attract sufficient users before adding more functionalities.

The ability to build a critical mass depends on users' speed of adoption (Ruutu et al. 2017) and their expectation of which ecosystem will flourish (Halaburda and Yehezkel 2016). Ecosystems can influence this proactively by developing *first-party content* instead of waiting for third-party contributors to innovate (Hagiu and Spulber 2013).

Finally, ecosystem orchestrators can use their pricing power to charge some participants, while offering products below their costs to others, that is, effectively *subsidizing* users that need to be attracted (Bakos and Halaburda 2020; Rochet and Tirole 2003). Where this is not possible in monetary terms, product bundling is a viable alternative (Amelio and Jullien 2012).

Given the risky challenges connected to launching and scaling a platform, Karhu and Ritala (2021) suggest opportunistic alternatives; *platform exploitation, pacing,* and *injection* describe strategies where an entrant exploits or copies an existing ecosystem's architecture and resources to skip the initial development steps.

3.4 FE (4): How do I compete within an ecosystem?

An important theme in the literature is the challenge of balancing different interests within an ecosystem. Authors suggest that in this coopetitive setting, where actors simultaneously collaborate and compete (Brandenburger and Nalebuff 1996), active management (Hannah and Eisenhardt 2018) with differing strategies is required (Karhu et al. 2014). Three perspectives of within-ecosystem competition can be observed: strategies of *orchestrator toward contributors (FE-4.1)*, strategies of *contributors toward their orchestrator (FE-4.2)*, and strategies *amongst contributors (FE-4.3)*.

The orchestrator (FE-4.1) receives the largest share of attention in the literature. As the regulator of the ecosystem, the orchestrator bears the responsibility of ensuring that all participants are content with their position (Adner 2017). The orchestrator must secure (a) participation that warrants a viable and value-creating ecosystem, while at the same time (b) ensuring value capture for itself.

The orchestrator can incentivize participation through the subsidization approach mentioned previously (Amelio and Jullien 2012; Bakos and Halaburda 2020; Rochet and Tirole 2003) or by adjusting the general pricing scheme (Hagiu and Spulber 2013; Karle et al. 2020; Kwark et al. 2017). Additionally, orchestrators can set the conditions under which contributors work and interact. Features such as third-party product reviews can affect users' perception of product quality and thus influence competition intensity between product providers (Kwark et al. 2017). Concurrently, the orchestrator aims to capture some value for itself and can do so either by changing its pricing approach or by entering the product spaces of successful contributors (Jiang et al. 2011; Zhu and Liu 2018).

The literature is not unanimous regarding how best to manage an ecosystem internally. Some find that orchestrators are not categorically better off collaborating, but that competition may sometimes be the superior choice (Mantovani and Ruiz-Aliseda 2016). Others propose that coopetitive constellations, such as the coexistence of contributors and orchestrators within the same product space, can yield positive results as long as they do not enter outright competition (Li et al. 2019). In any case, the orchestrator must carefully adapt its strategy. Aggressive behavior could lead to lost contributor support, risk of disintermediation (Cutolo et al. 2021; Gu and Zhu 2021), or increased multihoming (Bakos and Halaburda 2020; Karle et al. 2020; Rochet and Tirole 2003).

Despite the orchestrator exercising omnipresent influence over its ecosystem, the question how ecosystem contributors can successfully compete with their orchestrators (FE-4.2) has received relatively little attention. Authors suggest that contributors should decrease dependency on the ecosystem leader, as orchestrators may successively decrease their contributors' degrees of freedom (Cutolo et al. 2021). Orchestrators may also become more selective toward ecosystem contributors, especially with increasing influence, and focus on contributions of the highest quality, such that contributors may avoid joining dominant ecosystems (Rietveld et al. 2020).

According to Cozzolino and Rothaermel (2018), contributors should monitor the risk of orchestrators extending into their product spaces to capture additional value. In contrast, Li et al. (2019) suggest that this could be an opportunity that the contributor could benefit from. While authors have found that exclusive relationships augment a contributor's position and increase potential profit appropriation (Mantena et al. 2010), holistic strategic approaches for contributors are still lacking in the literature. However, the active strategy-making of contributors should be recognized; Inoue (2019) suggests that contributors can act strategically and, through a symbiotic effort, influence the behavior of their orchestrator.

Even fewer studies investigate strategies for competition between contributors within an ecosystem (FE-4.3) that compete for the same limited user attention (Belleflamme and Peitz 2019). The literature describes this as negative same-side network effects: the higher the number of contributors, the more intense the competition among them (Halaburda et al. 2018). Some early contributions have highlighted the role of differentiation rather than quality or performance (Barlow et al. 2019). Tiwana (2018), for example, studied app developers and found that individually differentiated contributions correlate with higher success than highly compatible solutions.

3.5 FE (5): How do I compete with other ecosystems?

The by far most researched theme within ecosystem strategy deals with the question of how to successfully compete with other ecosystems. Three main streams can be observed: addressing how *competitive dynamics (FE-5.1)* have changed, how ecosystems can differentiate based on *strategic positioning (FE-5.2)*, and which *competitive patterns (FE-5.3)* are visible.

Competing in an ecosystem world has arguably altered *competitive dynamics (FE-5.1)*, with network effects providing an essential source of advantage (Cennamo 2019). Authors suggest that industry boundaries have blurred and competition has consequently stretched beyond the original domains (Adner 2017). Winning competition within an industry has decreased in importance, as competition, in general, has moved from the company to the ecosystem level (Cennamo 2019). As the ability to create value no longer relies solely on asset ownership (Cha 2020) but rather on aligning partners around a value proposition (Adner 2017), firms must recognize the importance of incentivizing and supporting desirable partner behavior (Kyprianou 2018).

Network effects can also lead to hitherto unknown competitive dynamics, such as the *winner-takes-all (WTA)* phenomenon. WTA dynamics can cause markets to tip in favor of a dominant ecosystem (Cennamo 2019; Gawer and Cusumano 2008) as reinforcing network, scale and learning effects lead to an ever-increasing inflow of participants (Cennamo and Santaló 2013).

Although authors agree that WTA dynamics are a prominent factor shaping competitive strategies, their opinions on the effect's universality are more nuanced. Initially seen as unconditional, researchers are now creating a more differentiated view, suggesting that WTA dynamics are evitable and multiple ecosystems can coexist in the market, as differentiated consumer preferences and local bias (Cennamo and Santaló 2013; Huotari et al. 2017) impede continued growth.

Firms can actively influence competitive dynamics and avoid expected market tipping (Hossain et al. 2011) by choosing where to locate their offerings (Cennamo and Santaló 2013). Authors identified the active differentiation of an ecosystem as a major driver (Halaburda et al. 2018; Hossain et al. 2011), implying the continued importance of strategic positioning in ecosystem competition. Seamans and Zhu (2017) found that ecosystems tend to respond via differentiation rather than cost-cutting measures when challenged.

When market tipping and WTA dynamics do not occur, competition is likely to return to a price-based mechanism in which traditional patterns such as collusion are visible (Jullien and Sand-Zantman 2021; Mantena and Saha 2012). However, due to the blurring of industry boundaries, Steur (2018) suggests that WTA dynamics are not contained in ecosystem competition, but will likely spill over to the competition between ecosystems and industry (non-ecosystem) incumbents.

While the first research stream remains at the aggregated level of competitive dynamics, a second stream studies the choices and tools that ecosystems use to implement their *strategic positioning (FE-5.2)*. Positioning is seen as a critical lever for differentiation (Cennamo 2019), which the authors have linked to creating a competitive advantage (Gawer and Cusumano 2008; Rong et al. 2020). Three

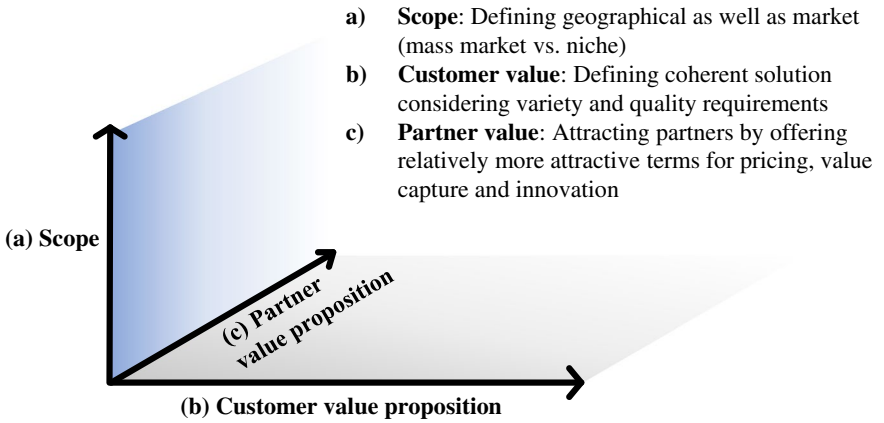

Fig. 3 Strategic positioning dimensions

dimensions of strategic positioning of ecosystems are discussed in the literature: (a) ecosystem scope, (b) customer value, and (c) partner value (Fig. 3).

Ecosystem scope, as the first dimension of competitive differentiation, defines which market to target and whether to aim for a mass market solution or focus on smaller niche segments (Eisenmann et al. 2011). It determines the market footprint, including whether the ecosystem targets specific customer groups, specializes in the market or bundles different services to span multiple markets (Cennamo 2019).

Conventional wisdom suggests that network effects and the potential for WTA dynamics favor the largest ecosystem (Gawer and Cusumano 2008; Rietveld et al. 2019). However, size may not necessarily be a winning strategy. Several contributions show that later entrants can overtake first-movers despite their size advantages (Casadesus-Masanell and Campbell 2019) and that even dominant platforms can be frequently displaced (Rietveld and Schilling 2021). Moreover, there is evidence that increasing network size may even negatively impact platform success and that a market strategy focusing on distinct segments may be superior (Cennamo and Santaló 2019). For example, Dushnitsky et al. (2022) find in their analysis of transaction platforms that ecosystems implement differentiated strategies and benefit from segmenting potential markets by targeting only specific user groups.

Pricing has been recognized as one of the main tools for influencing ecosystem scope. Specifically, subsidization or product bundling successfully attracts users and increases market share (Amelio and Jullien 2012; Lin et al. 2020). Similarly, exclusivity deals that prohibit contributors from offering the same product to a competing ecosystem present an effective means to influence the particular realm in which a BE is perceived as active (Cennamo and Santaló 2013).

Ecosystems can also differentiate themselves based on their *customer value proposition*. A trade-off exists between offering a varied, broad product portfolio and focusing on a highly curated offering that neatly addresses the users' preferred quality level. With the general idea that higher ecosystem generativity increases user satisfaction (Cennamo and Santaló 2013), initial research showed that offering

a broader complement portfolio leads to higher platform performance (Zhou and Song 2018). Cennamo (2018) specifies that it is the *variety* and respective *quality* rather than the sheer number of complements that form two distinct but interrelated sources of user value.

Variety describes the complement portfolio's functional width, which Karaer and Erhun (2015) have identified as an effective entry deterrent. A more varied complement portfolio seems attractive for addressing a wider range of potential users; however, it also increases the effort to communicate a coherent and unified product offering to the user base. Thus, the ecosystem must carefully consider how openly it will invite participants to contribute or how closely it will monitor the contributions (Karhu et al. 2020).

In addition to the question of how heterogeneous the complement base can be (Rietveld and Schilling 2021), the *quality* aspect has become more pronounced in recent research. Contributions revealed that ecosystems can charge higher prices despite offering lower choices to users if their quality preferences are matched (Halaburda et al. 2018). Mantena et al. (2010) find that the differentiating power of quality further increases the longer competition endures. This idea finds support as Rietveld et al. (2019) show that when an ecosystem actively promotes particular complements, it likely promotes those with the highest quality and development potential rather than the best performing.

While platforms balance the mix of how many and how varied complements to offer, and to what extent to ensure their quality, the trade-off is driven by the respective user base addressed and may change over time (Dushnitsky et al. 2022). In particular, the aspect of quality cannot be seen as static and the ecosystem must constantly adjust its strategic positioning and quality offering accordingly (Panico and Cennamo 2020; Rietveld et al. 2019).

In summary, the variety and quality of complements form a part of the ecosystem's identity and contribute to the differentiated customer value proposition that drives platform performance (Cennamo 2018, 2019). Chellappa and Mukherjee (2021) underline the importance of conveying differentiated customer value and find that even the perception of future product strength, communicated by strategically placing information about future products, can differentiate an ecosystem from its competitors.

A third source of competitive differentiation that is specific to business ecosystems relates to the *partner value proposition* and corresponding strategies to attract and retain sufficient and right partners to contribute. The orchestrator can use its architectural choices to create innovation opportunities and capacity for contributors (Cennamo 2019) and to ensure that the ecosystem is relatively more attractive for contributors than the next-best competitor.

The literature expresses this through the 'governance mechanisms' (Rietveld and Schilling 2021) that firms employ to attract contributors to their ecosystem and, more importantly, to manage whom they partner with (Hilbolling et al. 2020). The choice lies between open governance, inviting partners freely to contribute, and closed governance, in which the orchestrator maintains close control of the relationships within its ecosystem (Kazan et al. 2018; Rong et al. 2020). However, while an open governance approach may help to grow the ecosystem initially by allowing

many contributors to join, it poses the risk that contributors will switch to a dominant platform later on, underlining that governance must also be actively managed (Ruutu et al. 2017). Governance has received extensive research attention (Autio 2022; Boudreau 2010, 2012) and is often mentioned in the open innovation literature as a means to incentivize and coordinate innovation activities (Hilbolling et al. 2020; Masucci et al. 2020).

The third stream of between-ecosystem competition literature investigates observable *competitive patterns (FE-5.3)* and highlights specific strategic actions, in particular (a) cooperation and (b) opportunistic attacks.

Some authors have focused on the conditions under which *cooperation* can aid in between-ecosystem competition. They highlight that the overall strategy may benefit from collaboration by creating compatibility between products (Adner et al. 2020), or that incumbents may cooperate with opponents in one segment and compete in another (Cozzolino et al. 2021).

Others have focused on *opportunistic attacks*. Karhu and Ritala (2021) describe platform exploitation or platform forking as the competitive risk that an ecosystem contributor exploits the ecosystem's resources to enter direct competition. Similarly, a newly emerging ecosystem can copy an existing competitor's technical architecture (platform pacing), or enter the competitor's domain and occupy a niche (platform injection), effectively placing itself as a new competitor (Karhu and Ritala 2021). Thomas et al. (2021) suggest that the primary source of risk during such competitive actions and overthrow attempts lies with the ecosystem's management of interfaces and boundaries (i.e., their governance parameters), stressing the importance of a holistic value proposition, as even efficient ecosystems can fail.

3.6 FE (6): How do I develop my strategy over time?

Even ecosystems that have succeeded in establishing themselves in the market need to continuously develop their strategies to be successful. Only few studies have addressed this challenge and investigated the topics of *strategy adjustment (FE-6.1)* and *ecosystem expansion (FE-6.2).*

Research on BE *strategy adjustment* (FE-6.1) often relates to the concept of ecosystem life cycles initially introduced by Moore (1993). Initial discourses have drawn strong hypothetical parallels to the field of biology; forming in the birth stage, the ecosystem grows thereafter (expansion), turns to win outright competition (leadership), and then re-defines itself by innovating a new value proposition (self-renewal) (Moore 1993). Recent empirical studies have confirmed that life cycle stages can be observed for BEs (Chen et al. 2016), albeit more flexibly and in less predetermined ways than for their biological counterparts (Boyer 2020).

Rong et al. (2013a) found that firms exhibit different strategic patterns along their life cycles, with an open strategy model shown in the early and uncertain stages moving to more dominating and rigid models once the ecosystem matures and uncertainty declines. An orchestrator may foster behavioral conformity to preserve customer satisfaction when the focus moves away from rapid growth (Kyprianou 2018). Similarly, Rietveld et al. (2020) suggest that more selective governance

control mechanisms help to better serve end users' quality requirements as the ecosystem matures.

Autio (2022) suggests that a stricter governance model may also be motivated by the need to maximize value appropriation after the peak generativity of the ecosystem is reached. If the ecosystem does not expand its original purpose, the orchestrator may adopt a cash-out strategy as diminishing network effects toward later life cycle stages may decrease incentives for contributors to innovate (Panico and Cennamo 2020).

Despite its practical relevance, only little research has been done on *ecosystem expansion* (FE-6.2) and strategies to grow the ecosystem beyond its initial markets. Existing contributions have recognized both the potential (Jin and Hurd 2018) and challenges (Curchod et al. 2020) of international ecosystem expansion. Network effects seem to remain a decisive factor influencing the choice of timing, market, entry mode, and dynamics of multi-country competition (Stallkamp and Schotter 2021). Similarly, the opportunity to extend ecosystems across industry borders and realize the benefits of economies of scope and creation of entry barriers for newcomers has been recognized, but not strategically explored (McIntyre et al. 2021b).

4 Future research directions

Ecosystem strategy is a vibrant field of research that has received increasing attention over the past few years. The explosive growth in contributions has led to clusters of topic interests that lack coherent connections. Our review of the literature conceptualized existing research along strategic questions arising within the context of BEs. After analyzing and synthesizing the literature, this section derives potential areas of future research. First, we discuss the overarching themes visible in the literature body. Second, we identify the specific research questions in the developed ecosystem strategy framework. Third, we highlight the need for additional research methods.

4.1 Future research directions: overarching themes

Based on our review of the extant literature, we have identified two overarching opportunities for future research: (i) addressing currently less well-covered elements of our ecosystem strategy framework and (ii) using more differentiated approaches to account for the strategic context in which research is conducted.

Our review demonstrates that previous research has strongly focused on 'between-ecosystem competition' (FE-5), 'within-ecosystem competition' (FE-4), and ecosystem design (FE-3). We identified gaps in the literature related to capabilities required for ecosystem strategy, effective strategies for contributors, and expanding ecosystems beyond their initial domain.

The question of *ecosystem capabilities* becomes more relevant as an increasing number of firms participate in the ecosystem economy. Future research should explore which skills are required to discover and exploit ecosystem

opportunities and how incumbent (non-platform) firms can successfully transform into ecosystem players. In this context, strategies for *ecosystem contributors* should be more deeply investigated since there will be arithmetically more contributors than orchestrators. We know little about the relative attractiveness of orchestrator versus contributor roles and about the different strategic choices that firms have to succeed as contributors to business ecosystems. Finally, as ecosystems mature, they increasingly face the challenge of *expanding beyond their initial domain*. We need to better understand the strategic options for ecosystem evolution and how ecosystem strategy fits into the broader corporate strategy of diversified firms.

Beyond gaps in the coverage of the ecosystem strategy framework, our review showed that prior research largely investigated isolated strategic decisions and strategic tools of ecosystem orchestrators without linking them to specific strategic objectives. Many strategic tools can be applied to different elements of the ecosystem strategy framework but may have different (and perhaps even unwanted) implications.

Pricing is a prime example of a strategic tool that ecosystem orchestrators can use to execute their strategic objectives. However, it often remains unclear to what extent the pricing strategy aims to distribute value between ecosystem participants (internal pricing), to attract customers and increase market share vis-à-vis competing platforms (external pricing), or to subsidize one side of the market to foster growth in the early stages of the ecosystem. Similarly, ecosystem governance can be used as a strategic tool to manage the different stakeholders of an ecosystem but also as a source of competitive advantage to attract contributors and users to the ecosystem.

While we have provided an overview of these strategic options and tools in the context of the overall ecosystem strategy (Table 5, Appendix), future research would benefit from a unanimous use of terminology. This does not require labeling tools differently but calls for a more differentiated and concrete use of terms. Specifically, future research could extend its focus from the immediate impact of using specific strategic tools to include implications within a broader strategic context. The resulting understanding of how different strategic tools are interrelated and how their impact depends on their strategic purpose would increase the granularity in existing research questions and uncover previously unrecognized and potentially necessary connections between research streams.

4.2 Future research directions: specific research questions

In the following section, we present specific research questions along our research framework that present significant gaps in the existing literature. We do not claim these to be exhaustive and acknowledge that a wide range of further research could be conducted in the sub-areas of the discussed topics. We are also guided by questions that may arise from a practitioner's perspective, where an extension to the existing theory may be helpful. Five main directions were identified and translated into specific research questions (Table 1): (1) capabilities, (2) contributor

Table 1 Research questions by direction

Research direction	Research questions	Framework connection
(1) Capabilities	Which challenges arise during a full shift to an ecosystem/ platform organization? Which challenges arise when incumbents add a platform offering? What are strategic challenges when a business both becomes a platform and also joins another? Which metrics will be indicative for decision-making? Which skill profiles are required for ecosystems and firms turning to ecosystems? Which skills are firms looking for? How do functions have to change when ecosystem strategy changes, e.g., openness?	Framework element 2
(2) Contributor competition	Which factors guide strategizing as a contributor? How can contributors avoid commoditization of their orchestrator? What are archetypes of contributor strategies? What defense mechanisms can contributors employ against orchestrator entry? How does this differ between powerful/ less powerful orchestrators? How can contributors win competition amongst each other? What role does differentiation play from the viewpoint of a contributor? What role does cooperation play in competition amongst contributors? Can they collectively influence the ecosystem orchestrator?	Framework element 4

Table 1 (continued)

Research direction	Research questions	Framework connection
(3) Between-ecosystem competition	How can ecosystems define the best mix of scope, customer value and partner value? How can orchestrators Define the optimal mix of platform participants vs maximizing volume of participants? Set the optimal governance strategy to attract the right complementors? Define their optimal scope given specific contexts? Can either WTA or niche strategies be sustainable in the long term? To what extent do coopetition dynamics impact competitive strategies and require collaboration between competitiors based on overlapping user bases?	Framework element 5
(4) Interconnectedness of competition within and between ecosystems	How can the process of strategizing look like given that external tools impact internal conditions and vice versa? How can internal and external competition best be balanced? How can the orchestrator find the optimal trade-off when making competitive decisions? How can value capture and value creation be best combined? Could there be alternative tools to incentivize desired behaviour beyond the already known pricing/ subsidization?	Connection of framework elements 4 & 5

Table 1 (continued)

Research direction	Research questions	Framework connection
(5) Ecosystem expansion	Can and/ or should ecosystems be seen from a portfolio view, i.e., should ecosystem engagements become part of corporate portfolio strategy? How can ecosystems effectively expand beyond their domain? How can ecosystems grow without dominating certain markets? How does value creation from mergers and acquisitions between platforms / platform diversification occur? To what degree do these activities differ from those of traditional firms?	Framework element 6

competition, (3) between-ecosystem competition, (4) interconnectedness of competition within and between ecosystems, and (5) ecosystem expansion.

4.2.1 Research direction (1): capabilities

Scholars have found ample evidence of how ecosystems differ from traditional forms of developing strategies (Adner 2017; Cennamo 2019; Cennamo and Santaló 2019) and have underlined that different skillsets (see Sect. 3.3) would be required to compete effectively (Teece 2007). However, research has not yet been advanced to specify how these requirements may change, which specific capabilities will be required, and how they can be acquired. This forms a prominent research gap that practitioners have shown a keen interest in (Evans et al. 2021; Greeven and Yu 2020; van Alstyne and Parker 2021). Only a few initial contributions (e.g., Altman and Tushman 2017) have addressed these questions by explaining which organizational challenges may arise due to the manifestation of the ecosystem economy.

Specifically, future research should investigate characteristics of an effective ecosystem organization for both orchestrators and contributors, which organizational capabilities correlate with success, and how the organization needs to adapt when ecosystem strategy parameters (such as openness and control) change. Moreover, managing the transition to an ecosystem organization is a crucial challenge for many incumbents. As participants can join ecosystems in different roles, future research could differentiate between firms (a) transforming their core business into a platform offering, and (b) adding an offering while keeping their core business untouched.

4.2.2 Research direction (2): contributor competition

In most existing research, contributors have been mainly seen as exogenous factors (e.g., Karle et al. 2020; Kwark et al. 2017) that respond to orchestrator input rather than actively strategizing as autonomous actors. Although some authors have suggested that contributors can act strategically and exert influence, only a few studies have focused their analyses on contributors. Putting an increased focus on the contributor could help us better understand internal ecosystem relations as a strategic interplay and provide vital guidance to the many firms that find themselves in ecosystem contributor roles.

Specifically, future research should investigate how a contributor can effectively compete with the orchestrator of its respective ecosystem, build a sustainable competitive position, avoid commoditization by the orchestrator, and minimize the likelihood and negative impact of orchestrator entry into the contributor's product space. Research should also address how contributors can win against competing contributors in the same ecosystem and explore the dynamics that define competition between contributors, the strategic tools available to differentiate and create a competitive advantage, and the extent to which (changing) orchestrator choices create boundary conditions for this competition.

4.2.3 Research direction (3): between-ecosystem competition

Although presenting the largest body of existing research (see 3.5), the topic of between-ecosystem competition is still developing. The discussion on the shapes of

competitive and WTA dynamics (e.g. Cennamo and Santaló 2013) and the levers ecosystems can pull to create a competitive advantage is ongoing.

Future research should take a holistic perspective on active competitive differentiation along the different dimensions of strategic positioning that we identified in the literature (see Sect. 3.5). For example, researchers should investigate how a BE can effectively design its *customer value proposition* to attract the right mix of users corresponding to its offering and balance the conflicting goals of maximizing user numbers and ensuring a high quality of interactions. Similarly, future research should explore which governance strategy leads to a superior *partner value proposition*, given specific contexts, and how ecosystems can assess and decide on their optimal *scope*. The different dimensions of strategic positioning have hitherto been studied mainly in isolation, so future research should also analyze their interactions to uncover unavoidable trade-offs and find dominant positioning choices across dimensions.

In addition, future research should look more deeply into the coopetitive dynamics of interactions between ecosystems and uncover when and under which circumstances cooperation may occur between competing ecosystems. This is an exciting avenue for exploring highly practical implications for several reasons. For example, under the assumption that contributors participate in multiple ecosystems, the question arises how compatibility between platforms can create value through synergies and network effects between contributors. Similarly, overlapping user bases may make the same consideration relevant for the customer-facing side, and thus require research into the extent to which cooperation may be a superior strategy compared to direct competition between ecosystems. This may be particularly relevant for nested ecosystems.

4.2.4 Research direction (4): interconnectedness of competition within and between ecosystems

Existing research has studied competitive strategies within and between ecosystems largely in isolation. However, as we have outlined above (see Sect. 4.1), the two strategic fields are strongly interrelated and the same strategic tools that are applied in one context can have spillover effects on the other.

Future research should more carefully differentiate between strategic objectives when assessing strategic tools that can be used for internal and external competition. For example, analyses of ecosystem governance need to specify whether strategic actions aim to change the external (partner) value proposition or the internal distribution of authority and decision rights. Similarly, analyses of pricing strategies should clarify whether the immediate goal is to attract (external) user attention or change the (internal) value distribution within the ecosystem.

In addition, future research should explicitly investigate the impact of the strategic actions on the other realm of competition. For example, we need to better understand how changes to the pricing strategy for users to compete with another ecosystem will impact value distribution value capture ability within the ecosystem, and how changes to the governance model to better match the need for internal alignment affect the ecosystem's attractiveness for external partners in competition with other ecosystems.

4.2.5 Research direction (5): ecosystem expansion

The extant literature recognizes the concept of ecosystem life cycles, with research now investigating how certain aspects of strategy may change over time (see Sect. 3.6). However, the vast majority of contributions locate an ecosystem in a particular domain, defining it by its corresponding value proposition (Adner 2017; Cennamo 2019), and studying its mechanics and dynamics within that specific domain. Ecosystem expansion has been mainly investigated in the context of internationalization.

Given the increasing maturity of many business ecosystems, the question how to leverage existing capabilities to expand beyond the initial market and across industry boundaries gains importance, as evidenced by growing interest in practitioner-oriented publications (Adner 2015; Zhu and Iansiti 2019). Future research should investigate the role of economies of scope (from acting in multiple markets) compared with economies of scale (from growing within one market), how capabilities can be transferred from one ecosystem domain to another, and which challenges may arise in relation to the original ecosystem model. Such research should also account for recent debates around market power and ecosystem regulation (e.g., Jacobides and Lianos 2021) and address the question of how ecosystems can grow without dominating individual markets.

Beyond these practical considerations, our review has also uncovered the need for a broader theoretical perspective. Most existing research assumes either individual participants within an ecosystem or the ecosystem itself as the unit of analysis. However, the opportunity and need to expand ecosystems beyond existing domains raises the question how a firm's ecosystem strategy relates to its broader corporate (portfolio) strategy. Future research should explore the extent to which traditional corporate strategy theories can be applied in the context of ecosystems, how they need to be adapted, and how the transition towards ecosystems impacts traditional organizational models.

4.3 Future research directions: research methods

In addition to addressing gaps in the literature and responding to the needs of practitioners, the field of ecosystem strategy research would benefit from an extension of the research methods used. As mentioned above (see Sect. 2.2), extant studies have primarily focused on empirical case studies, theoretical modelling, and verbal conceptualizations. These approaches reflect the emerging nature of research in this developing field and may continue to yield new results. However, the current state of research impedes the testing of comparable hypotheses and tentative theories, especially across individual industries. Thus, it is difficult to draw distinct and general conclusions from the empirical findings.

Although some areas of interest, including how contributors react to orchestrator entry (Wen and Zhu 2019; Zhu and Liu 2018), have been concretized in the context of e-commerce and mobile app markets, the exploratory character of this research implies that the results are not yet generalizable. For example, first-party content has been identified as a helpful tool for attracting users; however, the authors

acknowledge that the observed difference in application and efficacy across industries remain unexplained (Kretschmer et al. 2022). Future research should move from exploratory to what Ridder (2017) describes as theory-developing or theory-testing in order to provide the foundation for a better understanding of the main hypotheses, their driving factors, and where they (do not) hold.

Specifically, future research should focus on the empirical validation of the rich existing body of hypotheses and concepts from theoretical modelling and verbal conceptualization approaches. Especially for theoretical models that rely heavily on assumptions, validation through empirical data could help confirm or reject such assumptions and further identify boundary conditions and additional variables to be considered. Through data-driven analysis, hypothesis-based approaches can help detect theoretical gaps in emerging concepts or extend existing theories by identifying anomalies. The study of strategic choices of firms to differentiate by Dushnitsky et al. (2022) provides an excellent example of how future work can test existing concepts around platforms and their strategic identity (Cennamo 2019).

5 Conclusion

The presence of business ecosystems in the global economy has become increasingly pronounced. Today, most of the world's most valuable companies are built around ecosystem models which those firms orchestrate (Gawer 2014). While highly relevant for start-ups, where it is estimated that more than 60% of most valuable unicorns are reaping ecosystem models (Gawer 2014), BEs are becoming relevant for incumbent firms. They have to consider how to react to them if not adjust their model to embrace them. In doing so, a novel consideration emerges as they must decide whether to orchestrate a BE or merely contribute to one. BEs carry new challenges, such as the task to bring on two or more different user sides. Firms must decide how to launch their ecosystem and incentivize participation to activate network effects.

Orchestrators face the novel challenge of managing their ecosystem. But in contrast to traditional firms with hierarchical value chains or vertical integration (Tiwana 2018), actors participate voluntarily and decide autonomously thereby creating a new set of considerations for both orchestrators and complementors. As a result, BEs' rightfully define their scope and not only create value propositions for customers, but also for their partners. Moving away from asset advantages used to gain market share, firms now consider strategies aimed at growing the size of their market thereby increasing value creation for its ecosystem participants. With competition moving from firm to ecosystem level, early research claims that formulating strategy works differently in the contexts of BEs (Birkinshaw 2019; Cennamo 2019) with existing frameworks stretched to their limits.

An overview of the current literature is necessary not only to define the playing field, but also to reflect the breadth of strategic challenges carried by ecosystems. This systematic review of the ecosystem strategy literature offers two main contributions.

First, an ecosystem strategy framework was developed that organizes existing research into six dominant themes, covering the implications and potential benefits of business ecosystems, sources of ecosystem opportunities, engagement models and required

capabilities, ecosystem design and launch, within-ecosystem competition, between-ecosystem competition, and ecosystem strategy adjustment and expansion. Although all themes have attracted some academic interest, the review uncovered areas of concentration and others with only limited coverage. More importantly, the ecosystem strategy framework enables practitioners and researchers to take a holistic perspective on ecosystem strategy, along the stages of strategy development and decision-making.

Second, this study identified areas for future research. Beyond gaps in the coverage of the ecosystem strategy framework, mainly related to capabilities required for ecosystem strategy, effective strategies for contributors, and expanding ecosystems beyond their initial domain, the review demonstrated that prior research largely investigated isolated strategic decisions and strategic tools of ecosystem orchestrators without linking them to specific strategic objectives. Five specific directions for future research were identified and translated into specific research questions, comprising ecosystem capabilities, contributor competition, between-ecosystem competition, interconnectedness of competition within and between ecosystems, and ecosystem expansion. Moreover, future research should move from exploratory to theory development and theory testing, specifically focusing on the empirical validation of existing hypotheses and concepts from theoretical modelling and verbal conceptualization approaches.

Overall, we hope that this study sparks further interest in the field of business ecosystem strategy to make it more accessible to practitioners and academics alike and to allow it to achieve the prominence it deserves, given the relevance of business ecosystems in our time.

Appendix

Method of article identification

A Boolean search query was drafted focusing on articles' titles, abstracts and author keywords. Under the overarching theme of business ecosystems we understand different types of ecosystems that focus on the creation of services or products with value propositions targeted at specific customers or users (Daymond et al. 2022). In order to be identified as an ecosystem the search had to include one of the following: "business ecosystem", "innovation ecosystem", "transaction ecosystem", "digital ecosystem", "two-sided market", "multisided market", "platform", "two-sided platform", "multisided platform", or "digital platform". We used wildcards (*) to include plurals and hyphenations. With this approach, we follow the theoretical definition of Adner (2017) whereby ecosystems subsume different types that aim at realizing and providing a particular value proposition.

The articles were hand-screened in order to filter out database errors. We classified as such 'false positives' meaning articles that were returned based on our search terms but referred to 'ecosystems' or 'platforms' in a different context. We screened title, abstract and read the study and we excluded studies, for example, on *natural ecosystems*, *physical platforms* such as oil & gas offshore platforms, *product*

platforms that describe supply chain specific manufacturing specifications, *technological platforms* such as 'sensing platforms' in bioelectronics, certain chemical compound platforms, or certain medical platforms describing treatments or drug families. Further, we excluded a few studies in which the strategy aspect was unrelated to 'business' strategy. Examples include the 'competition between different technological types of broadband platforms (e.g., xDSL, fire-optic, HFC)', 'strategies to manage technological defects on offshore O&G platforms' or media-focused 'publishing strategies of news outlet platforms'.

Please see Fig. 4, Tables 2, 3, 4, 5 below.

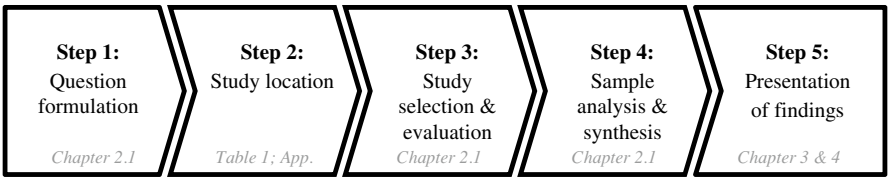

Fig. 4 Step-wise approach to systematic literature review

Table 2 Literature inclusion criteria & study location, inspired by Denyer and Tranfield (2009) and Webster and Watson (2002)

Criterion	Approach
Keywords definition	We developed search terms to (i) return results allowing for the breadth of nomenclature used by authors to describe ecosystem strategy, while (ii) limiting the search to a manageable amount of articles. Consequently, we built a search string around the concrete idea of ecosystem strategy and its synonyms and conducted the search with different degrees of stringency in title, abstract or author keywords The full string is available in Appendix in Table 3
Research field	Rietveld and Schilling (2020) have highlighted that scholars from different academic fields have contributed to BE research – as such, this review is not limited to one field but follows and interdisciplinary approach
Ecosystem term & type	The review recognizes the variety in terms used to refer to business ecosystems and thus includes articles using synonyms (e.g., platform, multi-sided market, intermediary, …)
Time horizon	The time horizon was defined to begin in January 1993 – which marks the year in which Moore (1993) coined the term business ecosystems – and ends with the date of the database search on September 1st 2022. Spot tests showed that including data dating back to before 1993 would have skewed results towards topics unrelated to business ecosystems
Database selection	Three distinct databases were used in order to ensure completeness and minimize bias. While Web of Science and Scopus are estimated to cover ~ 95% of research articles (Oliveira et al., 2018), we added EBSCO's Business Source Complete to close potential remaining gaps
Journal selection	To ensure data quality, we focused on articles published in peer-reviewed academic journals and excluded conference proceedings. Due to the relative youth of the research field, we have decided to not apply a JCR-quality cut-off point in order to not omit relevant contributions of more junior or less prominent researchers

Table 3 Literature search criteria and process steps (search on September 1st, 2022)

Step	Description	Results			
1	Definition of fundamental parameters for study	Language: English Date range: 1993–2022 Sources: Peer-to-peer reviewed academic journals			
2	Definition of primary search terms for title or keywords	((("business ecosystem*" OR "innovation ecosystem*" OR "transaction ecosystem*" OR "digital ecosystem*" OR "platform ecosystem*" OR "two?sided market*" OR "multi?sided market*" OR "platform*" OR "two?sided platform*" OR "multi?sided platform*" OR "digital platform") AND ("strateg*")) OR (("business ecosystem*" OR "innovation ecosystem*" OR "transaction ecosystem*" OR "digital ecosystem*" OR "platform ecosystem*" OR "two?sided market*" OR "multi?sided market*" OR "platform*" OR "two?sided platform*" OR "multi?sided platform*" OR "digital platform") AND ("compet*")))			
3	Definition of secondary search terms	("ecosystem strateg*" OR "platform strateg*" OR "strateg* * multi?sided market*")			
4	Complete search string	TI = (("business ecosystem*" OR "innovation ecosystem*" OR "transaction ecosystem*" OR "digital ecosystem*" OR "platform ecosystem*" OR "two?sided market*" OR "multi?sided market*" OR "platform*" OR "two?sided platform*" OR "multi?sided platform*" OR "digital platform") AND ("strategy" OR "strategies" OR "strategic" OR "strategi?e") OR ("business ecosystem*" OR "innovation ecosystem*" OR "transaction ecosystem*" OR "digital ecosystem*" OR "platform ecosystem*" OR "two?sided market*" OR "multi?sided market*" OR "platform*" OR "two?sided platform*" OR "multi?sided platform*" OR "digital platform") AND ("strategy" OR "strategies" OR "strategic" OR "strategi?e")) OR AK = (("business ecosystem*" OR "innovation ecosystem*" OR "transaction ecosystem*" OR "digital ecosystem*" OR "platform ecosystem*" OR "two?sided market*" OR "multi?sided market*" OR "platform*" OR "two?sided platform*" OR "multi?sided platform*" OR "digital platform") AND ("strategy" OR "strategies" OR "strategic" OR "strategi?e") OR ("business ecosystem*" OR "innovation ecosystem*" OR "transaction ecosystem*" OR "digital ecosystem*" OR "platform ecosystem*" OR "two?sided market*" OR "multi?sided market*" OR "platform*" OR "two?sided platform*" OR "multi?sided platform*" OR "digital platform") AND ("strategy" OR "strategies" OR "strategic" OR "strategi?e"))			
5	Selection of database for study	Web of Science (Core Collection)	EBSCO (Bus. Source Compl.)	Scopus (Elsevier full)	Total
6	Search results	1286	874	1893	**4053**
7	Elimination of duplicates & database errors	(1715)			2338

Table 3 (continued)

Step	Description	Results			
8	Elimination of false positives based on title & abstract	(1846)			492
9	Elimination of false positives after reading study	(59)			433
10	Sub-total	326	62	45	433
14	Addition through snowballing	4			**437**

Table 4 Prioritized literature body (n = 108) mapped to framework elements; ordered alphabetically

Authors & publication year	(1) Why are business ecosystems a relevant strategic topic?	(2) Where can I act & how do I engage?	(3) How do I design & build an ecosystem?	(4) How do I compete within an ecosystem?	(5) How do I compete with other ecosystems?	(6) How do I evolve my strategy over time?
Adner (2017)	•			•		
Adner et al. (2020)				•	•	
Altman and Tushman (2017)	•	•				
Amelio and Jullien (2012)			•	•	•	
Autio (2022)			•	•		•
Bakos and Halaburda (2020)			•		•	
Barlow et al. (2019)				•	•	
Belleflamme and Peitz (2019)				•	•	
Beverungen et al. (2021)	•	•	•			
Bhargava et al. (2013)			•		•	
Bosch-Sijtsema and Bosch (2015)		•	•	•		
Boudreau (2010)			•	•	•	
Boudreau (2012)				•	•	
Boyer (2020)					•	•
Brunswicker et al. (2019)			•		•	
Casadesus-Masanell and Campbell (2019)			•		•	
Cennamo (2018)				•	•	

Table 4 (continued)

Authors & publication year	(1) Why are business ecosystems a relevant strategic topic?	(2) Where can I act & how do I engage?	(3) How do I design & build an ecosystem?	(4) How do I compete within an ecosystem?	(5) How do I compete with other ecosystems?	(6) How do I evolve my strategy over time?
Cennamo (2019)	•				•	
Cennamo et al. (2020)	•	•			•	
Cennamo and Santaló (2013)		•	•		•	
Cennamo and Santaló (2019)				•		
Cha (2020)	•					
Chellappa and Mukherjee (2021)					•	
Chen et al. (2019)	•					
Chen et al. (2016)	•			•		
Chen et al. (2016)						•
Cozzolino et al. (2021)	•			•	•	
Cozzolino and Rothaermel (2018)				•	•	
Curchod et al. (2020)					•	•
Cutolo et al. (2021)				•	•	
Dushnitsky et al. (2022)				•	•	
Eisenmann et al. (2006)					•	•
Gawer and Cusumano (2008)			•		•	

Table 4 (continued)

Authors & publication year	(1) Why are business ecosystems a relevant strategic topic?	(2) Where can I act & how do I engage?	(3) How do I design & build an ecosystem?	(4) How do I compete within an ecosystem?	(5) How do I compete with other ecosystems?	(6) How do I evolve my strategy over time?
Gomes et al. (2018)					•	
Gu and Zhu (2021)				•		
Hagiu (2013)			•	•		
Hagiu et al. (2020)	•		•	•		
Hagiu and Spulber (2013)			•		•	
Halaburda et al. (2018)					•	
Halaburda and Yehezkel (2016)			•	•	•	
Hannah and Eisenhardt (2018)		•		•	•	
Hilbolling et al. (2020)				•	•	
Hossain et al. (2011)					•	
Huotari et al. (2017)					•	
Inoue (2019)	•			•	•	
Jacobides et al. (2018)	•	•	•	•	•	
Jeitschko and Tremblay (2020)				•	•	
Jiang et al. (2011)				•	•	
Jin and Hurd (2018)	•		•			•
Jullien and Sand-Zantman (2021)					•	

Table 4 (continued)

Authors & publication year	(1) Why are business ecosystems a relevant strategic topic?	(2) Where can I act & how do I engage?	(3) How do I design & build an ecosystem?	(4) How do I compete within an ecosystem?	(5) How do I compete with other ecosystems?	(6) How do I evolve my strategy over time?
Kamalaldin et al. (2021)		•		•	•	
Karaer and Erhun (2015)			•		•	
Karhu et al. (2020)			•	•	•	
Karhu et al. (2014)			•	•	•	
Karhu et al. (2014)					•	
Karhu et al. (2020)				•	•	
Karle et al. (2020)				•	•	
Kazan et al. (2018)					•	
Kenney and Pon (2011)		•	•		•	
Khanagha et al. (2022)	•		•	•	•	
Kim (2018)			•			
Kretschmer et al. (2022)	•		•	•	•	
Kwak et al. (2018)			•	•		
Kwark et al. (2017)				•	•	
Kyprianou (2018)			•	•	•	
Li et al. (2019)				•		
Lin et al. (2020)				•	•	
			•			

Table 4 (continued)

Authors & publication year	(1) Why are business ecosystems a relevant strategic topic?	(2) Where can I act & how do I engage?	(3) How do I design & build an ecosystem?	(4) How do I compete within an ecosystem?	(5) How do I compete with other ecosystems?	(6) How do I evolve my strategy over time?
Ravi Mantena and Saha (2012)				•	•	
Ravindra Mantena et al. (2010)				•	•	
Mantovani and Ruiz-Aliseda (2016)				•		
Masucci et al. (2020)			•	•	•	
McIntyre et al. (2021a)					•	•
Panico and Cennamo (2020)				•	•	•
Pellizzoni et al. (2018)	•	•			•	
Rietveld et al. (2019)				•	•	
Rietveld et al. (2020)				•	•	•
Rietveld and Schilling (2021)				•	•	
Rochet and Tirole 2003)		•	•	•	•	
Rong et al. (2013a, b)						•
Rong et al. (2020)	•	•			•	
Rong et al. (2013a, b)	•	•	•	•		
Ruutu et al. (2017)			•		•	
Saarikko et al. (2019)			•			•

Table 4 (continued)

Authors & publication year	(1) Why are business ecosystems a relevant strategic topic?	(2) Where can I act & how do I engage?	(3) How do I design & build an ecosystem?	(4) How do I compete within an ecosystem?	(5) How do I compete with other ecosystems?	(6) How do I evolve my strategy over time?
Seamans and Zhu (2017)					•	
Stallkamp and Schotter (2021)	•		•		•	
Staykova and Damsgaard (2015)			•		•	
Staykova and Damsgaard (2016)			•			
Steur (2018)	•		•	•	•	
Stummer et al. (2018)			•		•	
Teece (2007)	•					
Thomas et al. (2021)				•	•	
Tiwana (2018)				•	•	
Tukiainen et al. (2019)	•	•	•	•	•	
Wallbach et al. (2019)			•		•	
Wallin (2012)			•			
Walrave et al. (2018)		•	•	•		
Wareham et al. (2014)			•	•		
Zhao et al. (2020)		•	•		•	•
Zhou and Song (2018)			•		•	
Zhu and Liu (2018)				•		
Total	22	16	44	55	73	12

Table 5 Glossary mapping of terms (I/II)

Term	FE-1: Why are business ecosystems a relevant strategic topic?	FE-2: Where can I act & how do I engage?	FE-3: How do I design & build an ecosystem?	FE-4: How do I compete within an ecosystem?	FE-5: How do I compete with other ecosystems?	FE-6: How do I evolve my strategy over time?
Bundling			Form of subsidization executed through non-monetary incentives (i.e., bundling of products)	Form of subsidization executed through non-monetary incentives (i.e., bundling of products)	Form of subsidization executed through non-monetary incentives (i.e., bundling of products)	
Chicken-or-egg			Challenge in early stage growth to attract users to ecosystem before network effects kick off			
Competitive dynamics	Description how the rise of ecosystems impacts existing firms competing				Discussion of how the competitive logic has changed and how ecosystems compete	
Coopetition				Setting where participants of the same ecosystem collaborate and compete at the same time	Setting in between-ecosystem competition where ecosystems may benefit from cooperation (e.g., one-way compatibility)	
Coring					Activities to design an element making it fundamental to a system or market	

Table 5 (continued)

Term	FE-1: Why are business ecosystems a relevant strategic topic?	FE-2: Where can I act & how do I engage?	FE-3: How do I design & build an ecosystem?	FE-4: How do I compete within an ecosystem?	FE-5: How do I compete with other ecosystems?	FE-6: How do I evolve my strategy over time?
Disinter-mediation				Discussion of internal control mechanisms (governance) to avoid contributors building direct user relationship		
Governance			Establishment of initial model aimed at allowing easy access for contributors and incentivize participation	Activities to distribute value and manage participant behaviour through pricing schemes and control mechanisms/ rules	Foundation for partner value proposition ("competing based on governance") to attract relatively more or better contributors compared vis-a-vis competing ecosystem	General context of how governance mechanisms (internal & external) change across life cycle stages of ecosystems
Multi-homing				Discussion of how internal governance is affected by the risk of contributors/ users participating in multiple ecosystems simultaneously	Discussion of how possibility of contributors/ users participating in multiple ecosystems simultaneously affects strategic actions vis-a-vis competing ecosystems	

Table 5 (continued)

Term	FE-1: Why are business ecosystems a relevant strategic topic?	FE-2: Where can I act & how do I engage?	FE-3: How do I design & build an ecosystem?	FE-4: How do I compete within an ecosystem?	FE-5: How do I compete with other ecosystems?	FE-6: How do I evolve my strategy over time?
Platform exploitation					General process of exploiting competitors' resources to benefit in competition and avoid development costs	
Platform injection					Placing own technology infrastructure inside existing ecosystem to benefit from incumbent platform and resources (e.g., Adobe Flash in Apple iOS)	
Platform pacing					Copying of competitor's boundary resources to attract complementors and establish oneself as direct competitor of existing platform	
Pricing			Mostly referring to subsidization in early growth stages	Pricing scheme to moderate contributor behaviour, but also business model (agency vs wholesale) and basis for incentivizing participation (subsidization)	Product pricing towards users to compete based on price vis-a-vis other ecosystems, but also subsidization to gain market share	

Table 5 (continued)

Term	FE-1: Why are business ecosystems a relevant strategic topic?	FE-2: Where can I act & how do I engage?	FE-3: How do I design & build an ecosystem?	FE-4: How do I compete within an ecosystem?	FE-5: How do I compete with other ecosystems?	FE-6: How do I evolve my strategy over time?
Segmentation			Process of segmenting customers to focus on core users first in initial growth phase	Description how i) platform features can influence consumer behaviour and conversely the way contributors compete, and ii) how orchestrators can segment contributors when deciding which product spaces to occupy themselves	Decision on whether to address the mass market or particular segments and whether to offer uniform or individualized value proposition	
Staging			Process of adding functionalities or market exposures in step-wise fashion to limit risks and costs in growth phase			
Subsidization			Subsidization to attract certain participants to ecosystem and kick-start network effect	Subsidization of certain participants to keep ecosystem viable and foster innovation of needed innovation	Subsidization to gain market share in users or attract relatively better contributors vis-a-vis competing ecosystem	

Table 5 (continued)

Term	FE-1: Why are business ecosystems a relevant strategic topic?	FE-2: Where can I act & how do I engage?	FE-3: How do I design & build an ecosystem?	FE-4: How do I compete within an ecosystem?	FE-5: How do I compete with other ecosystems?	FE-6: How do I evolve my strategy over time?
Tipping					Activities/ process of tipping market towards certain standard to win control of the market and ultimately succeed in ecosystem competition	
Value capture				Mechanism to monetize value created from ecosystem activities		
Value distribution				Distribution of create value between ecosystem members through pricing scheme but also access to IP, data and know-how		
Winner-takes-all					Dynamic of market gravitating towards one dominant ecosystem in competition driven by scale, economies of scope and learning effects	

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Declarations

Conflict of interest The authors have no competing interests to declare that are relevant to the content of this article, no support in financial or non-financial matter was received.

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