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Reconstructing Business Ecosystem: A Phenomenon Review and Action-Centric Operationalization

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Abstract

The business ecosystem phenomenon is a revolutionary that is causing a paradigm shift in strategy aggregation. However, lack of its operational definition stifles positivist research and impedes empirical verification, generalization, and application. The purpose of this essay is to investigate business ecosystem definitions through the lenses of business ecosystem and systems theory, with the goal of advancing a synthesized, operational definition. The authors performed an integrative and generative literature review using a meta-theoretical approach with lenses of systems theory and business ecosystem theory to reconstruct an action-centric operationalization of the business ecosystem phenomenon. The review finds that the interplay of collaboration, innovation and competition is not addressed, and the criterion construct of business ecosystem health is scarcely included in the definitions. A business ecosystem, according to the review, is *"a meta-organization of interdependent entities orchestrated by a focal firm that aligns to a value proposition through collaboration and coevolves around an innovation, in order to achieve competitive advantage for delivering value to customers and to sustain the health of the ecosystem in a changing environment"*. The operational definition posited reveals the hidden assumption of holism of the business ecosystem phenomenon, which professes systemic strategy investigation instead of narrow, firm level analysis, for configurational theorizing, invoking counterintuitive shift in scholarship and practice. The essay argues for transitioning the business ecosystem research mode from inductive to deductive and suggests new research direction.

Keywords: Business Ecosystem, Collaboration, Innovation, Competition, Business Ecosystem Health

Introduction

Over the course of the last 25 years, the business ecosystem phenomenon, having its origin in parallel with the biological ecosystem presented by Moore (1993), and Iansiti and

Levian (2004a) in their pioneering works, has received extensive scholarly and strategy management attention, and is evolving into a positive theory that is relevant to modern-day competitive businesses driven by innovation, as it explicates how interdependent businesses operate (Adner, 2017; Jacobides et al., 2018; Kretschmer et al., 2022; Singal, 2021). The phenomenon draws credence, particularly in the extant hostile business environment characterized by turbulence and change, variations, and uncertainty (Gomes et al., 2021; Ramezani & Camarinha-Matos, 2020).

Nevertheless, the flexibility of the business ecosystem phenomenon has led to conceptual overstretch being used with various derivative forms and connotations resulting in a chaotic situation in its cognition and application (Aarikka-Stenroos & Ritala, 2017; Suominen et al., 2019; Thomas & Autio, 2020). The business ecosystem is a systemic phenomenon and in congruence with the systems theory, it provides a systemic and holistic perspective at a macro level (Bhardwaj et al., 2022; Midgley & Lindhult, 2021), however, a deliberate capture with expansive emphasis on the system-level tenets and concept is not distinctly apparent (Wurth et al., 2021; Phillips & Ritala, 2019; Ritala & Gustafsson, 2018). The networks and ecosystems are two different manifestations of managing the interdependencies amongst business organizations (Adner, 2017; Shipilov & Gawer, 2020); however, the concepts of ecosystem and networks are used interchangeably (e.g., Radziwon & Bogers, 2018; Suominen et al., 2019; Zahra & Nambisan, 2012). The business ecosystem strategy is best suited when the environment is hostile but malleable, however, there is a paucity of studies extending well-deserved theoretical attention to the controlling effect of the exogenous business environment (Hou & Shi, 2021; Russell & Smorodinskya, 2018; Ramezani & Camarinha-Matos, 2020)

The business ecosystem is a novel phenomenon and provides valuable opportunities for pursuing both qualitative and quantitative studies (Kapoor, 2018; Adner, 2017), however, there is a lack of empirical research (Adner, 2017; Neumeyer & Corbett, 2017; Teece, 2013), and quantitative studies are yet to be initiated in this field since the phenomenon has not transitioned from conceptualization to operationalization (Cobben, Ooms, Roijackers, & Radziwon, 2022; Jarvi & Kortelainen, 2017). The business ecosystem has an activity regime of collaboration, competition, and innovation (Kapoor, 2018; Moore, 1993; Jacobides, Cennamo, & Gawer, 2018; Singal, 2021) resulting in an interplay of these core activities (Hoffman et al., 2018; Moore, 1993). However, these are not operationalized to describe the business ecosystem construct. Recognizing that the absence of operationalization inhibits theory from being scientific which can be subjected to verification or falsification with deductive theorizing (Easterby-Smith et al., 2018; Popper, 2005), it is imperative to review the phenomenon and undertake its operationalization.

This essay, with an integrative and generative literature review approach, to assess, critique, and synthesize (cf., Post et al., 2020; Snyder, 2019;) carries significance by responding to these concerns for invoking rigor and specificity for the operationalization of business ecosystem phenomenon. The precise aim of the endeavour is to establish the causal relationship between the multiple constructs for configurational theorizing (cf., Cornelissen, Höllerer, & Seidl, 2021; Furnari, et al., 2021) that facilitates the creation and testing of the conceptual model with a deductive approach (cf., Cortina, 2016; Snyder, 2019).

Objectives of the Review

In line with the background set out above, the objective of this essay is to answer the following concrete and practical question: What is the operational and action-centric

definition of the business ecosystem construct? Furthermore, it is noted that operational definitions are concerned with the observable properties or operations of the referred phenomenon, and seek precision and parsimony since remaining clear, general, and concise even as circumscribing the elements of component objects, key underlining attributes, action regimes, and performance metrics, in a measurable form. (Kumar, 2014; Podsakoff, et al., 2016; Post, et al., 2020). Following the research question, the essay sets out threefold aims:

- First, to critically review the past literature arguing definitions of the business ecosystem construct;
- Second, to find the gaps in defining the business ecosystem construct; and
- Third, to define the business ecosystem construct with action-centric variables, particularly in the strategy context.

Accordingly, the remaining sections of the essay are organized as follows. At the outset, an overview of the extant literature on systems theory and business ecosystem theory are presented. Following section analyses the different definitions. Subsequent section posits the synthesized definition of the business ecosystem construct for its operationalization and, explicates its elements and implications thereof. The ultimate section provides concluding commentary on the contribution of this essay and posited operational definition with corresponding theoretical and practical implications.

Theoretical Foundations of the Business Ecosystem Phenomenon

Prior to moving into the analysis of the exemplary definitions of the business ecosystem, we present the overview of the theoretical foundations of the business ecosystem. The business ecosystem phenomenon is an application of system thinking in sense of business drawing an analogy with the natural ecosystem. The business ecosystem theoretical exposition heavily relies on a few pioneering works and needs empirical and conceptual advancement to bring coherence to the theory (Suominen et al., 2019; Tsujimoto et al., 2018). Due to this, there is a necessity of having underpinning around “systems” thinking, which is an established theoretical foundation, further, it is an integral part of the business ecosystem concept (Bhardwaj et al., 2022; Phillips & Ritala, 2019; Ritala & Gustafsson, 2018; Roundy et al., 2017). Following this, it is worthwhile to synthesize and integrate these two theories to operationalize the business ecosystem phenomenon.

- **Systems Theory**

The system theory in current times goes beyond system science and system thinking and intuitively stresses the importance of interrelatedness and holism stating that the interconnected elements generate the whole, with this whole being greater than the sum of parts (Midgley & Lindhult, 2021). The key features of the systems theory are: (i) complex systems invoke study with holism for collective behaviour; rather than reducing them to distinct components, as they do not explain the phenomenon, (ii) relationships and interactions among the parts are important than single elements, (iii) the common properties of all systems, provides a potential for applying system approach across the physical and social sciences, at different levels and scale, and (iv) the health of the system is contingent upon the fitness of individual components (Bhardwaj et al., 2022; Easterby-Smith et al., 2018; Mitleton-Kelly, 2003).

- **Business Ecosystem Theory**

The business ecosystem phenomenon has been explicated in literature from three perspectives which are: (i) business ecosystem as a meta-organization (Kapoor, 2018; Kretschmer et al., 2022; Singal, 2021); (ii) business ecosystem as structure (Adner, 2017; Graça & Camarinha-Matos, 2021; Jacobides, Cennamo, & Gawer, 2018); and (iii) business ecosystem as a coevolving and affiliated community (Hou & Shi, 2021; Iansiti & Levian, 2004; Moore, 1993, 2006). The meta-organization approach refers to the relationship among the constituent parts that define and specify the composite whole as an “organization of organizations” and determine the properties of the integrated system as a composite unity with institutional logic (Kretschmer et al., 2022; Thomas & Autio, 2014). The structuralist approach (Adner, 2017; Jacobides et al., 2018) delineates the physical manifestation of business ecosystem activities and interactions among parts of the system around the core activities of collaboration, innovation, and competition. The coevolution approach underscores the critical importance of core activities of collaboration, innovation, and competition for the economic performance of the ecosystem and impresses upon the systemic and economic health of the business ecosystem (Hou & Shi, 2021; Iansiti & Levian, 2004; Moore, 1993, 2006). Even though these perspectives have contrasting elements, a review of these perspectives shows that there are common and invariant aspects of (i) organizational constitution of interdependence; (ii) strategic objectives of collaboration, continuous innovation, and constant competition; and (iii) system level goal of shared success for common welfare and continuity of business.

Review of Business Ecosystem Definitions

The exemplary definitions from various scholars are provided in **Error! Reference source not found.** and analysed on four circumscribing elements adapted from (Podsakoff, MacKenzie, & Podsakoff, 2016), which are: (i) constituent objects, (ii) key underlining attributes, (iii) action regimes, and (iv) function and performance outcomes. The aggregations of entities in a business ecosystem are referred to with generality as, “community” (Hou & Shi, 2021; Moore, 1993, 1996); “heterogenous participants” (Thomas & Autio, 2020; Iansiti & Levian, 2004); “actors” (Jacobides et al., 2018; Kapoor, 2018); “entities” (Fuller, Jacobides, & Reeves, 2019). Some definitions have identified specific entities such as buyers, suppliers, product and service makers, individuals and institutions, customers, and the environment (Dias Sant’Ana et al., 2020; Thomas & Autio, 2020); and entities from “supply side and demand side” (Autio & Thomas, 2018). These definitions mention the focal firm of the business ecosystem as the “ecosystem leader” (Moore, 1996) or “platforms” (Jacobides, Cennamo, & Gawer, 2018). The systemic “interconnected” attribute of the business ecosystem is referred to as “multilateral” (Adner, 2017; Jacobides et al., 2018); “interdependent” (Radziwon & Bogers, 2018; Teece, 2016); “complementary” (Fuller et al., 2019; Jacobides et al., 2018). The business ecosystem is also referred to as a “network” of firms (Chang & Uden, 2008; Den Hartigh & Van Asseldonk, 2004; Williamson & De Meyer, 2012). At times business ecosystem is also described as a “loose network” (Iansiti & Levian, 2004b); a “shifting, semi-permanent network” (Fuller et al., 2019). This underscores the need to make a distinction between the business ecosystem and network, as it is not claimed that networks are ecosystems (Iansiti & Levian, 2004b, p. 37). Network and alliances perspectives (Harrigan, 2017; Madhavan & Prescott, 2017) are narrow in focus since these are concerned with connectivity through the direct, formal, and embedded ties which are repeated and enduring (Adner, 2017; Kapoor, 2018; Shipilov & Gawer, 2020). In contrast, the business

ecosystem consists of participants directly or indirectly connected and includes networks and alliances as participants in the ecosystem by themselves (Adner, 2017; Pushpanathan & Elmquist, 2022; Radziwon & Bogers, 2018).

The definitions address the action regime with varied emphasis. The mutualistic perspective among the organizations in the business ecosystems is reflected in the cooperation and collaboration (Graça & Camarinha-Matos, 2021; Fuller et al., 2019) as well as navigation of competition within and across the ecosystems (Fuller et al., 2019; Hannah & Eisenhardt, 2018). The unique action regime of coevolution, akin to the natural ecosystem, is delineated (Fuller, Jacobides, & Reeves, 2019; Moore, 2006; Radziwon & Bogers, 2018). The coevolutionary mechanisms of symbiosis in the biological ecosystem are the major source of novelties and innovation for the individual organism and the whole ecosystem (Hird, 2010; Guerrero et al., 2013; Von Bertalanffy, 1950). Analogous to this phenomenon of the biological ecosystem, the coevolution of the business ecosystem around innovation is encapsulated only in the definitions by Teece (2016). The function and performance outcome aspects are scantily referred to: “health performance” (Iansiti & Levian, 2004). The health measure referred to in these definitions refers to collective performance and draws inspiration from performance measures of the biological ecosystem (Hyrnsalmi & Mantymaki, 2018a, 2018b), which is assessed as a “comprehensive, multiscale, measure of system vigour, organization, and resilience” (Constanza, 2012, p. 24).

The definitions reviewed show the business ecosystem as an aggregation of firms and organizations, that are heterogeneous and autonomous entities (Kretschmer et al., 2022; Singal, 2021), under the focal firm forming an affiliation (Hou & Shi, 2021; Hou et al., 2020). The systemic “interconnected” attribute (Midgley & Lindhult, 2021) of the business ecosystem is also captured in the business ecosystem definitions. As in the case of the biological ecosystem, the business ecosystem has a regime of core activities of collaboration, competition, and innovation (Jacobides et al., 2018; Moore, 1993; Singal, 2021); however, the exemplary definitions describe them with varied emphasis and, the function or performance outcomes are scantily referred.

Operationalization of the Business Ecosystem

In contrast to the lack of coherence in the reviewed definitions of the business ecosystem concerning the action regimes of collaboration, competition, and innovation as well as the absence of focus to describe the interplay amongst these constructs, Moore (1993), inspired by the phenomenon of the biological ecosystem, accords equal emphasis on action regimes to note that “in a business ecosystem, companies co-evolve capabilities around an innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate next round of innovations” (p.76). Against this, defining and operationalizing an observed phenomenon invokes “a systematic explanatory statement about the relationships among a set of constructs, with accompanying logic and assumptions” (Cortina, 2016; Ferris et al., 2012, p. 96). As analyzed above, the reviewed definitions are devoid of the invariant characteristics of the business ecosystem (cf., Thomas & Autio, 2020) and the interplay of collaboration, innovation, and competition in the business ecosystem (Hoffman et al., 2018; Moore, 1993) with the central theme of “value creation and/or value capture” (Tsujiimoto et al., 2018, p. 52). Following the foregoing and building on the examination of the business ecosystem definitions with grounding on the cross-section of theoretical approaches ruminated in the preceding sections, the essay posits a synthesized, operational definition of the business ecosystem, as follows

“Business ecosystem is a meta-organization of interdependent entities, orchestrated by a focal firm, that aligns to a value proposition through collaboration and coevolves around an innovation, to attain competitive advantage for delivering value to customers and to sustain the health of the ecosystem in a changing environment”.

The implications of the posited operational definition posited are described in the succeeding paragraphs.

- Business ecosystem as a meta-organizational form

The business ecosystem represents an aggregate, “meta-organizational” form that “connects multiple organizations, actors, activities, interfaces”, and invokes collective actions and benefits (Battisti, Agarwal, & Brem, 2022; Kapoor, 2018; Kretschmer, Leiponen, Schilling, & Vasudeva, 2022, p. 407; Singal, 2021). The entities in the business ecosystem are distinct; at the same time have multilateral, synergistic interdependence across organizations and activities (Adner, 2017; Thomas & Autio, 2020; Jacobides, Cennamo, & Gawer, 2018). Business ecosystem thinking accords critical importance to the component going into technological solutions provided by the suppliers as well as a complementary product, services, or infrastructure provided by the “non-generic” complementors (Jacobides, Cennamo, & Gawer, 2018; Kapoor, 2018). The ecosystems relate to unique or non-generic complementors that invoke specific relationships or alignment to create value (Jacobides, Cennamo, & Gawer, 2018) by generating synergy (Thomas & Autio, 2017). The business ecosystem entities, involved in developing complex and coherent system-level solutions, are heterogenous entities spanning beyond particular industry sectors (Autio, 2022; Thomas & Autio, 2020).

The systemic participants of the business ecosystem include suppliers, complementors, and system integrators; and in addition to these, may include distributors, advertisers, financiers, universities and research institutions, standard-setting bodies and regulatory authorities, the statutory bodies, policymakers, and customers as well (Thomas & Autio, 2020; Tsujimoto et al., 2018). Complementors are distinct from suppliers. Suppliers provide components going into business offerings while complementors create or enhance the value proposition by being non-generic (Autio, 2022; Jacobides et al., 2018; Kapoor, 2018). Customers also play a role in establishing the collaborative partnership in the business ecosystem (Basole & Park, 2019) such as preferential requirements, and thus play a role in deciding the number of complementors and demand-based economies of the scale (Panico & Cennamo, 2022). Customer participation thus helps value creation (Joo, 2018).

- Business ecosystem’s offerings through focal firm orchestration

The focal firm’s orchestration involves persuasion of others to contribute voluntarily towards the ecosystem’s offerings which take place in overlapping, multiple layers at different stages of an ecosystem built up: “technological (optimization of connectivity, maximize generativity, and control bottlenecks), economic (attract participants, drive systemic effects, extend leverage), institutional (role definition, conflict resolution, regulatory embedding) and behavioural (dynamic control, promote behavioural norms, ecosystem leadership)” (Autio, 2022, p. 104). Contrary to a conventional market-based strategy which calls for firms to adapt to exogenous market competition, a business ecosystem strategy involves the focal firm to “build”, “leverage” and “extend” the competitive position of the collective of the ecosystem endogenously with the active contribution of participants (Adner, 2017; Autio & Thomas, 2018, pp. 112, 122). This invokes the necessity of diligent orchestration of the collective efforts of the heterogeneous participants without hierarchical control and decentralized governance in changing business environment towards the shared context and vision of the

ecosystem. The roles of the focal firm can be parallel or dynamic with the evolution of the ecosystem with changes in participants or with the generation of resources and the applicability of roles is contingent upon assuming these roles (Tabas et al., 2022; Thomas & Autio, 2020). The focal firm articulates system-level goals; establishes the interfaces; provides rules of engagement and protocols; populates the standards; shares technological know-how; or extends financial support. Focal firms use these tools to discipline and motivate ecosystem participants (Jacobides et al., 2018).

- Business ecosystem value creation through collaboration and alignment

The collaboration in the business ecosystem facilitates the alignment of the interdependent ecosystem partners to the shared value proposition and shared context relating to rules of interactions and flow of resources, knowledge, and information (Huo et al., 2022; Lingens et al., 2021; Singal, 2021; Thomas & Ritala, 2022). The alignment of the meta-organization provides distinctive characteristics to the business ecosystem in contrast with networks, alliances, or supply chains (Lingens et al., 2021; Thomas & Autio, 2020). Collaborative mutualism helps to provide resources and expand capabilities for advances in technology and innovation knowledge and to create a mutual identity (Thomas & Ritala, 2022). The business ecosystem collaboration alleviates uncertainties in innovations, compared to the purely transactional model, for complex solutions involving multiple technologies, even developing generations of technologies, coming from different suppliers and complementors (Datee et al., 2018; Hannah & Eisenhardt, 2018; Khanagha et al., 2022). The focal firm provides the “value blueprint” for collaborative interactions amongst the firms; specifies the contributions expected and ensures the distribution of value. These collaborative arrangements pose challenges to the focal firm as the complementary firms are coming from diverse industries, with their strategies driven by competitive pressures germane to those industries (Adner, 2017; Bremner et al., 2017). The collaborative complementarities are from both supply and demand side actors that boost ecosystem output (Jacobides et al., 2018; Phillips & Ritala, 2019).

Collaboration drives the innovation output and value creation in the business ecosystem through the development and absorption of technology as it facilitates sharing of resources and investments, allows firms to synergize knowledge, skills, and physical efforts, and provides benefits of knowledge spillover and technology transfer through know-how (Agarwal & Kapoor, 2018; Goswami et al., 2018; Thomas & Autio, 2020). The alignment through collaboration mitigates the ex-ante risks (Adner & Feiler, 2019). The inter-organizational collaborative relationships provide the resource buffer and bridging to insulate the organization from environmental changes (Roundy & Bayer, 2019); thus, the organization would obviate failure, with distinct transformation patterns; dampens the risk of uncertainty in the environment and facilitates adaptation to the uncertain environment (Ramezani & Camarinha-Matos, 2020; Russell & Smorodinskya, 2018). Collaboration provides a source of attaining competitive advantage through resource and knowledge exchange (Brink, 2019; Radziwon & Bogers, 2018). Collaboration contributes to sustaining ecosystem health (Iansiti & Levian, 2004a), by enhancing robustness to survive external shocks (Ramezani & Camarinha-Matos, 2020) and by improving productive performance (Stonig, Schmid, & Müller-Stewens, 2022).

- Ecosystem co-evolution through innovations

The coevolution of the ecosystem is driven by the continuous innovations in the ecosystem which entails activities “to digest external shocks and absorb external opportunities” (Hou & Shi, 2021, p. 5). The business ecosystem entities are engaged in symbiotic interactions (Neumeyer & Corbett, 2017; Sun et al., 2020), and undertake innovation in order to enhance the value propositions (Ganco et al., 2020; Kapoor, 2018). The complexity of innovation has led to the application of a systems perspective since it involves collaborative interactions amongst a multitude of actors in the ecosystem (Meissner et al., 2017; Midgley & Lindhult, 2021). Systemic connectivity allows access and use of technological knowledge dispersed across the ecosystem for generating innovations (Antonelli, 2017). The complex innovations are the collective output of the collaborative efforts of the heterogenous ecosystem participants (Russell & Smorodinskya, 2018; Thomas & Autio, 2020). The business ecosystem is regenerative in the sense that it “self-produces, maintains and renews its ecosystem nature by creating new elements and relationships within itself as required” (Midgley & Lindhult, 2021, p. 643). The realization of the value proposition around the innovation is contingent upon the development of complementary products or modules (Jacobides et al., 2018; Kapoor, 2018), removing bottlenecks in technological progress (Masucci, Brusoni, & Cennamo, 2020) and managing dependencies (Ganco, Kapoor, & Lee, 2020). These innovation efforts include the selective revealing of knowledge and expertise, market information, resource integration, and joint product development (Rietveld, Ploog, & Nieborg, 2020). The ecosystem innovations facilitate attaining a competitive advantage for the ecosystem as a whole (Bremner et al., 2017; Rietveld & Schilling, 2021) and create a healthy ecosystem (Brodie et al., 2021; Pushpanathan & Elmquist, 2022). The business ecosystem needs to continuously innovate to negotiate the changes in the environment such as disruptive innovations (Kumarswamy et al., 2018; Palmie et al., 2020; Walrave et al., 2018).

- Business ecosystem as a source of competitive advantage

The locus of value generation has moved from firm to business ecosystem (Kapoor, 2018), and so is the evolution of competition (Kretschmer et al., 2022; Rietveld & Schilling, 2021). Correspondingly, the operationalization of competition manifested in competitive advantage with its foundation in industrial economics (Porter, 1985) is transitioned from a firm’s competitive advantage to a business ecosystem competitive advantage that challenges key assumptions of traditional competition strategies (Cennamo, 2021). In contrast with the traditional market focus on the demand side or supply side, the ecosystem market considers connectivity and coevolution of the supply and demand side in terms of its scale and scope (Cennamo, 2021). There is competition within the ecosystem to attract profits for self and also there is an alignment on how all members benefit from the collective enterprise and thus, gain an advantage over the rival ecosystem. This invokes the need to shift competitive analysis from firms’ standalone levels to aggregate levels of the ecosystem (Jacobides et al., 2018; Hannah & Eisenhardt, 2018). The ecosystem’s competitive advantage manifests in pricing approaches and differentiation for market positioning to seek trade-offs by competition within the ecosystem and between the ecosystems (Cennamo et al., 2018; Dinerstein et al., 2018; Rietveld et al., 2020; Seamans & Zhu, 2017). The ecosystem’s market positioning and its competitive advantage affect the overall performance and health of the ecosystem (Tiwana, 2018). The ecosystem’s competitive advantage is sourced by collaborating with the heterogenous participants for resources (Roundy & Bayer, 2019; Schrieck et al., 2021) and innovating the value offerings by sharing knowledge and other

resources with the complementors (Huang, Tafti, & Mithas, 2018; Khanagha, Ansari, Paroutis, & Oviedo, 2022; Zhang et al., 2022), which is realized through exploiting market prospects (Greve & Song, 2017) and overcoming the threats (Wen & Zhu, 2019).

- Business ecosystem health as a collective performance

The business ecosystem health construct provides a broader perspective of performance (Cobben et al., 2022) and is “a derivative metaphor” signifying the success of the ecosystem (Hyrnsalmi & Mäntymäki, 2018a, p. 141). In line with systems thinking, the health of individual firms and the utility of their product and services are dependent upon the health and products in the ecosystem, so it is essential to envision the collective health of the ecosystem (Alves et al., 2018; Iansiti & Levian, 2004a; Hartigh et al., 2013; Hyrnsalmi & Mäntymäki, 2018a, 2018b; Jacobides et al., 2018). Since the activities of business ecosystems are not concentrated, they have embedded resilience due to the flexibility to adapt to environmental changes (Thomas & Autio, 2020). The business ecosystem also gains resilience to adjust to changes since it can respond with a variety of offerings (Leong et al., 2016). The regenerative innovation imparts resilience to the business ecosystem (Cennamo & Santaló, 2019). The coherence in the ecosystem participants as well as a connected group to support each other brings systemic resilience to the ecosystem (Roundy et al., 2017). As is the case with the biological ecosystem and in congruence with system theory, the health of the business ecosystem beckons about the system’s stable existence for a reasonable time with growth and expansion (Hartigh et al., 2013; Jha et al., 2016; Singal, 2021). The business ecosystem health represents the long-term financial strength of robust and productive partners, engaged in collaboration, in managing competencies to exploit opportunities to realize competitive advantage. Further, the long-term system health has a persistent collaborative structure delivering innovations with a variety of niches (Hartigh et al., 2013; Hyrnsalmi & Mäntymäki, 2018a, 2018b).

Concluding Commentary

In contrast with the traditional functional, business, and corporate strategies that are at the firm level, the business ecosystem strategy, going beyond the network level, brings in a step change to offer a system-level strategy, presenting a holistic aggregation. The business ecosystem construct, thus, invokes counterintuitive changes in scholarly thinking and enjoins upon the management practice for higher strategy content with the systems approach (cf., Adner, 2017; Brodie et al., 2021; Iansiti and Levian, 2003; Midgley & Lindhult, 2021) with the system as a unit of analysis (cf., Post et al., 2020). The parsimonious operationalization in this study attempts to overcome the conceptual overstretch concerning the business ecosystem phenomenon (cf., Thomas & Autio, 2020; Suominen, et al., 2019; Aarikka-Stenroos & Ritala, 2017) and therefore extends the guidance for purposeful managerial actions.

The major implication of this essay in general, and the operational definition of the business ecosystem, is that integration of review presents an action regime of the business ecosystem; and such activity-based perspective, due to its very characteristics, complements both theory and practice. The business ecosystem phenomenon opens intriguing avenues for both qualitative and quantitative studies; however, the quantitative studies for theory testing at the ecosystem level with contextual understanding are scant (Adner, 2017; Javi and Kortelainen, 2017; Neumeyer & Corbett, 2017). The principles of parsimony, which are the foundation of strategy research, adopted for operationalization of the multilateral interconnectedness, envisaged to help empirical research by shifting the research mode from

inductive to deductive by identifying the novel research direction. The meta-theoretical approach of grounding the business ecosystem phenomenon with systems theory provides an avenue to theorize across these two domains and defining the activity systems and boundary conditions for examining the reality of the businesses. The systems approach in the business ecosystem phenomenon revitalizes with clarity causal relationship (cf., Makadok et al., 2018; Post et al., 2020). The operational definition of business ecosystem posited in this essay, thus, offers a wider opportunity for configurational theorizing of multiple constructs for developing the conceptual model and undertaking hypothetico-deductive studies in business ecosystem phenomenon (cf., Cornelissen et al., 2021; Cortina, 2016; Furnari, et al., 2021).

The operational definition uncovers the hidden assumptions of the holism of the business ecosystem phenomenon drawing heavily from the systems theory and introduces the hitherto ignored system level of analysis, in contrast to other business ecosystem studies that focus on the firm's strategy in the business ecosystem instead of examining the wholeness of the business ecosystem (cf., Jarvi & Kortelainen, 2017; Rong & Shi, 2015). The definition includes the elements of component objects, key underlining attributes, action regimes, and performance metrics, and supports the required precision and clarity for theory development and generalization with theory testing (cf., Makadok, Burton, & Barney, 2018). The essay argues for an opportunity for examining the core proposition of the business ecosystem phenomenon concurrently to capture the ecosystem's (i) multi-lateral alignment through collaboration, (ii) regenerative capacity through innovation, (iii) industrial-economics view of across-the-boundary competition, (iv) criterion of interest in terms of health performance outcome, and (v) controlling effect of the business environment.

The present essay, thus, makes significant contribution to theory, empirical contexts and policy making. The study provides a solid foundation for undertaking future research on the business ecosystem phenomenon in a changing business environment adopting meta-theoretical approach by integrating systems theory and business ecosystem theory and extends credence to urgent calls towards this in the scholarship (cf., Bhardwaj et al., 2022; Makadok et al., 2018; Phillips & Ritala, 2019; Post, Sarala, Gatrell, & Prescott, 2020; Schad & Bansal, 2018). The operationalization of the business ecosystem phenomenon holds significance for underatking deductive, emprical studies in the different context. The present study provides the processual view of the business ecosystem in terms of activity sequence of collaboration, innovation, and competitive advantage and helps define the policy drivers towards achieving sustainable business ecosystem health which would be relevant for managerial actions and policy road-mapping.

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Table 1
Exemplary Definition of Business Ecosystem

No.	Author & Year	Definitions and Descriptions	Constituent Objects	Attributes	Action Regimes	Functions/ Performance Outcomes
1	Moore (1996, p. 26)	"An economic community supported by a foundation of interacting organizations and individuals- the organisms of the business world. This economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organizations also include suppliers, lead producers, competitors, and other stakeholders, over time, they co-evolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments and to find mutually supportive roles."	<ul style="list-style-type: none"> community, suppliers, lead producers, competitors Stakeholders. Central companies ecosystem leader 	<ul style="list-style-type: none"> shared vision mutually supportive roles align to set the direction 	<ul style="list-style-type: none"> coevolution of capabilities 	
2	Iansiti and Levien (2004b, p. 35)	"Like biological ecosystems, business ecosystems are formed by large, loosely connected networks of entities. Like species in biological ecosystems, firms interact with each other in complex ways, and the health and performance of each firm are dependent on the health and performance of the whole. Firms and species are therefore simultaneously influenced by their internal capabilities and by their complex interactions with the rest of the ecosystem."	<ul style="list-style-type: none"> business entities 	<ul style="list-style-type: none"> loosely connected networks. interdependence considered "whole" 	<ul style="list-style-type: none"> complex interactions 	<ul style="list-style-type: none"> health performance
3	Rong and Shi (2015, p. 51)	"A business ecosystem is a community consisting of different levels of interdependent organizations which generate co-evolution between partners and their business environment."	<ul style="list-style-type: none"> organization community partners environment 	<ul style="list-style-type: none"> different levels interdependent 	<ul style="list-style-type: none"> coevolution 	
4	Teece (2016, p. 1)	"A business ecosystem is a group of interdependent organizations collectively providing goods and services to their customers. Shared standards and interfaces are inherent features of platform-based ecosystems. They permit the members of the ecosystem to innovate independently while competing collectively against other firms and/or ecosystems in the relevant market."	<ul style="list-style-type: none"> organization group 	<ul style="list-style-type: none"> interdependent collective 	<ul style="list-style-type: none"> provide goods. provide services. share standards. share interfaces. innovate compete 	

No.	Author & Year	Definitions and Descriptions	Constituent Objects	Attributes	Action Regimes	Functions/ Performance Outcomes
5	Adner (2017, p.42)	"The ecosystem is defined by the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize."	<ul style="list-style-type: none"> • partner set 	<ul style="list-style-type: none"> • alignment structure • multilateral 	<ul style="list-style-type: none"> • interact to materialize 	<ul style="list-style-type: none"> • value proposition
6	Jacobides, et al (2018, p.2264)	"An ecosystem is a set of actors with varying degrees of multilateral, non-generic complementarities that are not fully hierarchically controlled."	<ul style="list-style-type: none"> • set of actors 	<ul style="list-style-type: none"> • multilateral • complementary • no full hierarchy 		
7	Kapoor (2018, p.2)	"An ecosystem encompasses a set of actors that contributes to the focal offer's user value proposition."	<ul style="list-style-type: none"> • set of actors 	<ul style="list-style-type: none"> • focal offer • value proposition 		
8	Fuller et al (2019, p.3)	Business ecosystems "are multi-entity, made up of groups of companies not belonging to a single organization. They involve networks of shifting, semi-permanent relationships, linked by flows of data, services, and money. The relationships combine aspects of competition and collaboration, often involving complementarity between different products and capabilities (for instance, smartphones and apps). Finally, in ecosystems, players coevolve as they redefine their capabilities and relations to others over time."	<ul style="list-style-type: none"> • multiple entities • groups of companies 	<ul style="list-style-type: none"> • shifting network • semi-permanent relationships • complementarity 	<ul style="list-style-type: none"> • competition • collaboration • coevolve capabilities and relationship. 	
9.	Pidun, et al. (2022, p. 2)	"A business ecosystem is a dynamic group of largely independent economic players that create products or services that together constitute a coherent solution."	<ul style="list-style-type: none"> • Group • Independent players 	<ul style="list-style-type: none"> • Create product and services 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Coherent solution
10.	Kretschmer, et al., (2022, p. 407)	A platform ecosystem is a meta-organization that "connects multiple organizations, actors, activities, and interfaces, and are underpinned by interrelated social or economic value propositions or business models."	<ul style="list-style-type: none"> • multiple organizations • actors 	<ul style="list-style-type: none"> • organization organizations • interrelated 	<ul style="list-style-type: none"> of • activities 	<ul style="list-style-type: none"> • value propositions business models