ORIGINAL RESEARCH **Open access**

Managing Interdependence in Digital Business Ecosystems: Strategic Coordination Among Firms Operating Within Platform Networks

Luis Herrera[1*], Daniela Rojas[1], Andres Castro[2]

Abstract

Digital business ecosystems powered by platform networks are defined by profound interdependence among participating firms, where success depends on coordinated actions across autonomous actors rather than hierarchical control. Traditional management approaches fall short in these settings, as firms must simultaneously manage complementarities, network effects, and coopetition while enabling value co-creation. This manuscript introduces the Strategic Coordination of Interdependence in Platform Ecosystems (SCIPE) framework. This novel multi-layer conceptual model integrates actor roles, interdependence structures, coordination mechanisms, non-hierarchical governance, and adaptive feedback loops. Synthesized from peer-reviewed publications spanning strategic management, information systems, and innovation journals, the framework addresses critical gaps in the literature on ecosystem orchestration and governance. By delineating how platform owners and complementors can strategically align without formal authority, the SCIPE Framework advances theory on interdependence management and offers practical guidance for sustaining ecosystem vitality. The model emphasizes dynamic adaptation through feedback, balancing cooperation and competition to enhance resilience and competitiveness in digital markets. Theoretical contributions bridge fragmented streams on platform dynamics, while managerial implications equip leaders with actionable layers for coordination. Future extensions include cross-industry validation and longitudinal studies of adaptation processes.

Keywords Strategic coordination, Ecosystem orchestration, Digital business ecosystems, Platform networks, Interdependence, Coopetition

*Correspondence:
Luis Herrera
luis.herrera@gmail.com
[1] Department of Digital Enterprise Management, Pontifical Catholic University of Chile, Santiago, Chile
[2] Department of Business Analytics and Innovation Systems, University of Concepcion, Concepcion, Chile

Introduction

The digital economy has elevated platform networks to the dominant organizational form, where firms operate within ecosystems characterized by high interdependence rather than standalone value chains [1-4]. This transformation reflects a broader structural shift in how economic activity is organized [2], moving away from vertically integrated firms toward distributed configurations of loosely coupled yet interdependent actors. In such environments, value creation is no longer confined within firm boundaries [4]. Still, it emerges from coordinated interactions among platform owners, complementors, partners, and users [5, 6], all of whom contribute to and depend upon shared infrastructures [7-13]. Unlike conventional industries, these ecosystems rely on indirect network effects and complementary innovations [2], making the performance of one actor contingent on others. Consequently, competitive advantage is increasingly determined not by isolated firm capabilities [4] but by the ability to position effectively within

and orchestrate participation across a broader ecosystem [13].

Digital platforms serve as the foundational infrastructure that enables and sustains these interactions. Platforms are conceptualized as technological and organizational hubs that facilitate exchanges among multiple market participants [4, 13-19]. Through standardized interfaces, modular architectures, and scalable digital infrastructures [4], platforms enable heterogeneous actors to co-create value without requiring centralized control [13]. This architectural openness fundamentally alters the boundaries of the firm [6], transforming organizations into nodes within larger meta-organizations characterized by fluid participation and distributed authority. As a result, traditional distinctions between the firm and its environment become blurred [4], and strategic action must account for interdependencies that extend beyond formal organizational boundaries [13].

The rise of platform ecosystems also introduces new forms of complexity rooted in interdependence. Interdependence manifests through technological complementarities, shared data flows, and user-base linkages [18], generating both opportunities for collective value creation and risks of misalignment or free-riding [20-23]. Technological complementarities arise when the functionality of one component depends on the presence or performance of others [18], creating co-specialization among actors [22]. Shared data flows further intensify these dependencies by enabling real-time coordination while simultaneously increasing vulnerability to disruptions [23]. User-base linkages, driven by network effects [2], create additional layers of interdependence as the value of participation for one group depends on the size and engagement of others [3]. Together, these dimensions produce a tightly coupled system in which local decisions can have system-wide consequences [18].

From a strategic perspective, this interconnectedness fundamentally redefines the coordination problem. Ecosystems are conceptualized as structures of aligned activities [18], emphasizing that value creation depends on the successful integration of interdependent contributions [22]. However, alignment in such settings cannot be achieved through traditional hierarchical mechanisms [4], as ecosystem participants retain autonomy and may pursue divergent objectives [13]. Instead, coordination must be achieved through more sophisticated and indirect means that accommodate heterogeneity while fostering alignment [19]. This challenge is compounded by the absence of formal authority relationships [6], which limits the ability of any single actor to enforce compliance or dictate outcomes [8].

To address these constraints, firms deploy a range of coordination mechanisms designed to align behavior without relying on hierarchy. Standards, interfaces, and incentive systems play a central role in this process [8], enabling interoperability and guiding participation [14, 24-29]. Institutional work through standardization can create shared norms and expectations that stabilize interactions [8], while orchestration mechanisms evolve to navigate governance tensions [14]. These mechanisms function as embedded coordination devices that shape the behavior of ecosystem participants [8] by structuring the conditions under which they interact [14]. In doing so, they translate abstract interdependencies into operational alignment [29], allowing distributed actors to coordinate their activities in the absence of direct control.

The increasing importance of coordination mechanisms has significant implications for governance in platform ecosystems. Governance is no longer limited to formal rules and policies [7] but extends into the design of technological architectures and interaction protocols [9]. This convergence of governance and technology underscores the need for a more integrated understanding of how coordination is achieved in digital environments [20]. Mechanisms such as APIs, data standards, and modular interfaces simultaneously enable participation and impose constraints [8], blurring the distinction between enabling and controlling functions [14]. As a result, governance becomes embedded within the ecosystem's infrastructure [7], operating through both technical and social channels [9].

Within this context, platform leadership emerges as a pivotal yet paradoxical role. Platform owners occupy a central position within the ecosystem [7], providing the infrastructure and setting the rules of interaction [9], yet their authority is inherently limited by the autonomy of other participants [20]. Leadership, therefore, operates through influence rather than command [7], requiring platform owners to balance competing objectives and manage complex relationships [9, 20]. Configurational governance links leadership structures to complementor performance [20], highlighting the importance of aligning incentives and participation conditions. Frameworks for orchestration

practices emphasize the role of robust action in managing uncertainty and complexity [7, 9].

These insights reveal that effective platform leadership is less about exercising control [7] and more about shaping the ecosystem to encourage desirable behaviors [9]. This involves designing governance structures that balance openness and control [20], enabling innovation while maintaining coherence [7]. It also requires managing tensions between competing actors [9], ensuring that collaboration does not devolve into conflict and that competition does not undermine collective value creation [20]. In this sense, leadership becomes an exercise in ecosystem design [7], aiming to create conditions for decentralized actors to coordinate effectively [9].

A defining feature of this coordination challenge is the coexistence of cooperation and competition within the same system. Platform ecosystems are characterized by coopetition [17], where actors collaborate to create value while simultaneously competing to capture it [21]. The dynamic nature of this relationship shows how patterns of collaboration and rivalry evolve in response to changing conditions [17, 21]. This duality introduces persistent tension into ecosystem coordination [17], as actors must navigate conflicting incentives while maintaining alignment [21].

Managing this tension is central to ecosystem success. Excessive cooperation may reduce incentives for innovation and differentiation [17], while excessive competition may fragment the ecosystem and erode complementarities [21]. Effective coordination, therefore, requires mechanisms that balance these forces [17], enabling actors to collaborate where necessary while preserving competitive dynamics that drive innovation [21]. This balancing act underscores the complexity of managing interdependence [7], as coordination must accommodate both shared and divergent interests [9].

Despite the richness of existing scholarship on platform ecosystems, significant gaps remain in understanding how these elements fit together. Research has produced valuable insights into individual components such as network effects [2, 3], meta-organizational structures [5, 6], and digital innovation processes [25, 26]. However, these contributions are often fragmented [1], focusing on specific aspects of ecosystems without integrating them into a unified framework [11]. As a result, there is a lack of comprehensive models that capture the interplay between actor roles, interdependence structures, coordination mechanisms, governance systems, and adaptive processes [16].

Studies provide important building blocks by examining ecosystem dynamics, architecture, and boundary decisions [3, 12, 29]. Nevertheless, they stop short of offering a holistic conceptual architecture that guides strategic coordination across multiple layers [1]. Recent reviews reinforce this limitation [11], calling for integrative frameworks that synthesize disparate strands of research into coherent models that inform both theory and practice [16]. The absence of such frameworks constrains scholars' and practitioners' ability to fully understand and manage the complexities of platform ecosystems [1].

This manuscript addresses this gap by proposing the Strategic Coordination of Interdependence in Platform Ecosystems (SCIPE) Framework. Grounded in a carefully curated set of peer-reviewed studies spanning strategic management, information systems, and innovation research [2], the framework synthesizes existing knowledge into a cohesive, multi-layer architecture [3]. Drawing on insights from leading outlets [7], the SCIPE Framework integrates actor roles, interdependence mapping, coordination mechanisms, governance structures, and adaptive feedback loops into a unified model [17, 19-22, 28, 29].

The central contribution of the SCIPE Framework lies in its ability to translate abstract theoretical concepts into an actionable architecture for managing interdependence [1]. By organizing ecosystem coordination into distinct yet interconnected layers [4], the framework provides a structured approach to understanding how alignment can be achieved in non-hierarchical environments [7]. It emphasizes that coordination is not a single process but a multi-dimensional system in which structural, operational, and adaptive elements interact dynamically [11].

Moreover, the framework highlights the importance of feedback and adaptation in sustaining ecosystem performance. In rapidly changing digital environments [13], coordination must be continuously updated in response to new information, shifting incentives, and evolving relationships [16]. The SCIPE Framework captures this dynamic by incorporating feedback loops that connect outcomes back to earlier stages [19], enabling ongoing learning and adjustment [22]. This feature ensures that the

framework remains relevant in contexts characterized by uncertainty and change [24].

From a practical perspective, the SCIPE Framework equips platform owners and complementors with tools to orchestrate interdependence more effectively [27]. It provides guidance on designing participation structures [20], deploying coordination mechanisms [21], and implementing governance practices that balance autonomy with alignment [28]. By fostering a deeper understanding of ecosystem dynamics [24], the framework supports the development of strategies that enhance resilience and competitiveness in digital markets [27].

The remainder of the manuscript is structured as follows. The next section presents a detailed synthesis of the literature, organizing existing research into key conceptual foundations that underpin the SCIPE framework. This is followed by an in-depth exposition of the framework itself, including its layered architecture and underlying mechanisms. Subsequent sections elaborate on the implications of the framework for theory and practice, highlighting its contributions to the study of digital business ecosystems and strategic management. Through this integrated approach, the paper advances understanding of how interdependence can be strategically coordinated in platform networks, offering a foundation for future research and managerial innovation.

Literature Synthesis and Conceptual Foundations

Contemporary scholarship on digital business ecosystems converges on interdependence and coordination as core challenges, yet remains fragmented across themes. This synthesis organizes the referenced works into five interlocking foundations, revealing the need for an integrated model.

Platform ecosystems and actor structures form the base. These are defined as socio-technical systems in which a central platform connects autonomous actors, thereby inverting firm boundaries through developer participation [4, 13, 19]. The concept is extended to meta-organizations, emphasizing implications for strategy and design [5, 6]. These works establish that ecosystems transcend traditional firm-centric views and require coordination among platform owners, complementors, and partners [23, 26].

Interdependence structures constitute the second foundation. Ecosystems are theorized around unique complementarities and aligned activities, while value creation loci are broadened through network and spatial affordances that amplify mutual dependencies [18, 22, 23, 26, 28]. Dynamics driven by product scope and collaborative centrality show how interdependence evolves with innovation [3]. These studies underscore that unmanaged dependencies risk ecosystem failure, necessitating structured mapping.

Governance and orchestration mechanisms address coordination without hierarchy. Analyses of practices balance value co-creation against governance costs and leadership configurations [10, 20]. Orchestration frameworks and institutional approaches have been developed alongside reviews of architecture and governance trends [1, 7, 9, 12]. Boundary choices enable opening while maintaining orchestration [29]. Collectively, these references demonstrate non-hierarchical control through incentives, monitoring, and robust action [8, 9].

Coordination mechanisms and standards operationalize alignment. Asymmetric network effects link to governance, and standardization functions as institutional work [2, 8]. Research agendas synthesize work on interfaces and policy [11, 24]. These mechanisms—rules, APIs, and data protocols—enable inter-firm synchronization in the absence of contracts [14, 20].

Table 1 conceptualizes the governance–coordination tension inherent in platform ecosystems, illustrating how different governance configurations shape coordination efficiency, innovation, and ecosystem resilience.

Table 1. Governance–coordination tension matrix: balancing control, autonomy, and ecosystem performance

Dimension	High governance/Low autonomy	Balanced governance–autonomy	governr aut
Coordination efficiency	High short-term alignment but rigid	Optimal adaptive coordination	Frag coo
Innovation dynamics	Constrained innovation	Sustained ecosystem innovation	Unco inn

Complementor participation	Limited and controlled	Diverse and stable participation	Vola oppo part
Risk exposure	Low opportunism but high rigidity risk	Managed risk through adaptive governance	High o and i
Ecosystem resilience	Structurally stable but inflexible	High resilience and adaptability	Fra ur
Strategic outcome	Efficiency-dominant equilibrium	Dynamic value co-creation equilibrium	Brea platfo

Value co-creation, coopetition, and adaptation close the foundations. Co-creation processes and digital innovation transformation have been examined, while the evolution of coopetition and platform competition reveals the dynamic interplay of collaboration and rivalry [15, 17, 21, 25]. Overviews of platform business strategy and research trajectories emphasize that feedback and adaptation emerge as critical for resilience [3, 7, 16, 25, 27].

The synthesis exposes a clear gap: while individual themes are richly developed, no unified multi-layer architecture integrates actor roles, interdependence mapping, mechanisms, governance, and adaptive loops into a strategic coordination model. The SCIPE Framework fills this void by synthesizing the referenced works into a cohesive, actionable architecture tailored to platform networks.

Orchestrating Interdependence: Introducing the SCIPE Framework

To support strategic coordination in platform network building directly on the synthesized foundations, this section presents the Strategic Coordination of Interdependence in Platform Ecosystems (SCIPE) framework. This unique, multi-layer conceptual architecture operationalizes non-hierarchical coordination amid digital interdependence. The SCIPE Framework comprises five interconnected layers that guide firms from actor identification to adaptive value realization.

The ecosystem actor layer identifies participants and roles: the platform owner as central orchestrator, complementors as innovation providers, partners as enablers, and end-users as value recipients [6, 13, 19]. This layer establishes the relational foundation, clarifying responsibilities without imposing ownership.

The interdependence structure layer maps technological, relational, and market dependencies, highlighting complementarities and potential bottlenecks [3, 17, 18, 22]. Explicit mapping allows firms to anticipate ripple effects across the network.

The coordination mechanisms layer deploys practical tools —standards, APIs, incentive systems, and data interfaces —to align actions autonomously [2, 8, 14, 20, 29]. These mechanisms translate structure into operational synchronization.

The governance and orchestration layer enacts non-hierarchical oversight through monitoring, conflict resolution, and leadership influence [1, 5, 7, 9, 10]. The orchestrator maintains ecosystem integrity while preserving participant autonomy.

The value co-creation and adaptation layer channels resource and information flows, closing with feedback loops that enable learning and dynamic adjustment [7, 15, 21, 25]. Loops feed insights back to lower layers, supporting continuous evolution and a balance between cooperation and competition.

Table 2 delineates the cross-layer coordination logic of the SCIPE Framework, demonstrating how each structural layer contributes distinct yet interdependent functions that collectively enable non-hierarchical alignment.

Table 2. Cross-layer coordination logic in the SCIPE framework: structural roles, mechanisms, and strategic functions

SCIPE layer	Primary function	Core elements	C
Ecosystem actor layer	Defines participation structure	Platform owner, complementors, partners, and users	d ar
Interdependence structure layer	Maps dependencies	Technological, relational, and	

	and complementarities	market linkages	(
Coordination mechanisms layer	Enables operational alignment	APIs, standards, incentives, and data interfaces	sy
Governance and orchestration layer	Maintains system coherence	Monitoring, boundary rules, incentives, and leadership influence	In ir
Value co-creation and adaptation layer	Drives performance and evolution	Value flows, feedback loops, and coopetition dynamics	l

Layers interact bidirectionally, creating a resilient system in which coordination flows support value exchange, and adaptation responds to external shifts.

Figure 1 illustrates the SCIPE Framework as a multi-layer, networked architecture in which platform-centered interdependence is coordinated through embedded mechanisms, governed through non-hierarchical orchestration, and continuously reshaped by recursive adaptation loops.

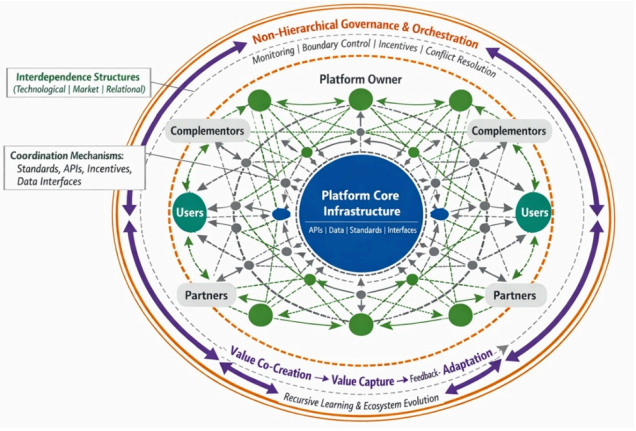

Figure 1. Interdependence and coordination architecture in digital business ecosystems. The SCIPE Framework advances prior work by unifying the literature into an actionable model for strategic decision-making.

Discussion: Reframing Interdependence as a Core Strategic Problem in Platform Ecosystems

Interdependence as the central unit of analysis

The SCIPE Framework advances a fundamental shift in how strategy in digital business ecosystems is conceptualized by repositioning interdependence as the primary unit of analysis rather than the firm. Traditional strategic management frameworks have treated the firm as the locus of value creation and control, with external relationships seen as supplementary or boundary-spanning extensions. However, in platform-based environments characterized by distributed innovation, indirect network effects, and co-specialized complementarities, the performance of any individual actor is intrinsically contingent upon the coordinated behavior of others [2, 3, 18, 22].

This reconceptualization has profound theoretical implications. It challenges the adequacy of firm-centric theories such as the resource-based view. It even extends beyond conventional interpretations of dynamic capabilities by embedding capability development within a network of interdependent actors rather than within organizational boundaries alone. In this context, value is not produced linearly but emerges from synchronized interactions across multiple participants whose incentives, technological architectures, and strategic goals may only partially align. The SCIPE Framework captures this shift by structuring coordination as a layered process in which actor roles, dependency structures, mechanisms, governance, and adaptive feedback are mutually constitutive rather than sequentially independent.

This perspective also clarifies why coordination failures in ecosystems tend to be systemic rather than localized. A misalignment in one layer—for example, poorly designed APIs or misaligned incentives—can propagate through interdependence structures and destabilize the entire ecosystem. Thus, strategy becomes less about optimizing isolated decisions and more about managing relational configurations that sustain collective functionality over time.

Beyond hierarchy: the emergence of distributed coordination logics

A second critical contribution of the SCIPE Framework lies in its articulation of coordination without hierarchy as a distinct organizational logic. In traditional firms, coordination is achieved through authority, formal contracts, and managerial oversight. In contrast, platform ecosystems rely on what can be described as infrastructural coordination, where rules are embedded in technical architectures, standards, and protocols rather than imposed through managerial fiat [8, 20, 29].

This shift represents not merely a change in tools but a transformation like control itself. Control becomes indirect, probabilistic, and emergent, operating through the design of participation conditions rather than direct supervision. Platform owners influence behavior by structuring access, visibility, and rewards, thereby shaping the opportunity space within which complementors operate. As a result, governance becomes deeply intertwined with technological design, and coordination is enacted through the interplay of code, standards, and incentives.

The SCIPE Framework formalizes this logic by positioning coordination mechanisms as a distinct layer that translates interdependence into operational alignment. This layer is not subordinate to governance but interacts dynamically with it, highlighting that mechanisms such as APIs and standards simultaneously enable coordination and embed governance constraints. The implication is that coordination and control are no longer separable functions but co-evolve within the same infrastructural systems.

The duality of cooperation and competition in ecosystem dynamics

A defining characteristic of platform ecosystems is the coexistence of cooperation and competition among participants, a phenomenon extensively described as coopetition [17, 21]. The SCIPE Framework integrates this duality by situating it within the value co-creation and adaptation layer, where actors simultaneously collaborate to expand ecosystem value and compete to appropriate a share of that value.

This duality introduces persistent tension into ecosystem coordination. Excessive cooperation may dilute competitive incentives and reduce innovation differentiation, while excessive competition may undermine collective value creation and destabilize complementarities. The SCIPE Framework addresses this tension by emphasizing the role of governance and coordination mechanisms in maintaining a dynamic equilibrium between these opposing forces.

From a theoretical standpoint, this suggests that ecosystem performance depends not on eliminating tension but on managing it productively. Tension becomes a generative force that drives innovation and adaptation, provided it is bounded by appropriate governance structures. The framework thus aligns with emerging perspectives that view strategic tensions not as problems to be resolved but as conditions to be orchestrated.

Recursive adaptation and the temporal dynamics of ecosystems

A further contribution of the SCIPE Framework is its explicit incorporation of recursive feedback loops that connect value outcomes back to earlier layers of the system. This feature highlights the temporal dimension of ecosystem coordination, where strategies are continuously refined in response to evolving conditions [3, 7, 25].

Unlike static models of strategy, the SCIPE Framework conceptualizes ecosystems as dynamic systems characterized by ongoing learning and adaptation. Feedback from user behavior, complementor performance, and market responses informs adjustments in governance policies, coordination mechanisms, and even actor roles. This recursive logic ensures that the ecosystem remains responsive to external shocks and internal imbalances.

Importantly, this temporal perspective underscores that coordination is never fully achieved but must be continuously reproduced. Stability in ecosystems is therefore provisional rather than permanent, emerging from ongoing processes of alignment rather than fixed structures. This insight extends the existing literature on dynamic capabilities by situating adaptation within a networked context in which multiple actors contribute to and are affected by feedback processes.

Theoretical Implications: Advancing Platform and Ecosystem Research

Integrating fragmented streams into a unified architecture

One of the most significant theoretical contributions of the SCIPE Framework is its integration of previously fragmented research streams into a coherent conceptual architecture. The existing literature has developed rich insights into the individual components of ecosystems, including network effects [2, 3], governance mechanisms [10, 20], and innovation dynamics [25, 26]. However, these streams have largely evolved in isolation, resulting in a lack of holistic models that capture their interdependencies.

The SCIPE Framework addresses this gap by synthesizing these elements into a multi-layer system in which each component is explicitly linked to others. Actor roles provide the structural foundation, interdependence mapping defines relational dynamics, coordination mechanisms operationalize alignment, governance structures ensure stability, and feedback loops enable adaptation. By articulating these layers and their interactions, the framework offers a comprehensive lens for understanding ecosystem coordination.

This integrative approach not only advances theoretical clarity but also facilitates the development of cumulative knowledge by providing a common structure within which future research can be situated.

Extending the concept of dynamic capabilities to ecosystem contexts

The SCIPE Framework also extends the concept of dynamic capabilities by embedding it within ecosystem-level processes. Traditional formulations of dynamic capabilities emphasize a firm's ability to sense, seize, and reconfigure resources in response to environmental change. However, in platform ecosystems, these processes are distributed across multiple actors, each contributing to and depending on collective adaptation.

By incorporating recursive feedback loops and interdependence structures, the SCIPE Framework reconceptualizes dynamic capabilities as networked phenomena that emerge from coordinated interactions rather than isolated organizational actions. This extension has important implications for understanding competitive advantage, which becomes a function of ecosystem-level alignment rather than firm-specific capabilities alone.

Reconceptualizing governance as infrastructural and relational

Another key theoretical implication concerns the nature of governance in digital ecosystems. The SCIPE Framework positions governance not merely as a set of rules or policies but as an infrastructural and relational system embedded within technological architectures and social interactions.

This perspective challenges traditional distinctions between formal and informal governance by showing how code, standards, and interfaces function as governance mechanisms alongside norms and incentives. It also highlights the relational dimension of governance, where legitimacy, trust, and influence are critical to sustaining coordination among autonomous actors.

Extended Managerial Implications: Designing for Ecosystem Resilience and Competitiveness

Strategic design of participation architectures

Managers operating in platform ecosystems must move beyond firm-centric optimization and instead design participation architectures that enable diverse actors to contribute effectively. This involves carefully balancing openness and control, ensuring that entry barriers are low enough to attract innovation while maintaining sufficient oversight to prevent fragmentation or opportunistic behavior.

The SCIPE framework guides by emphasizing the alignment of actor roles, interdependence structures, and coordination mechanisms. Managers must consider how these elements interact to shape participation dynamics, recognizing that poorly designed architectures can lead to underutilization of complementarities or excessive competition.

Continuous monitoring and adaptive governance

Given the dynamic nature of ecosystems, managers must adopt a continuous monitoring approach that leverages data and analytics to track performance across multiple dimensions. This includes not only financial outcomes but

also indicators of ecosystem health such as participation diversity, innovation rates, and user engagement.

Adaptive governance mechanisms must be developed to respond to these signals, enabling timely adjustments to policies, standards, and incentives. The SCIPE Framework highlights the importance of feedback loops in enabling such adaptation, underscoring that governance is an ongoing process rather than a one-time design decision.

Balancing stability and flexibility

A central managerial challenge in platform ecosystems is balancing stability and flexibility. Stability is required to ensure predictability and trust, while flexibility is necessary to accommodate innovation and change. The SCIPE Framework addresses this tension by distinguishing between structural layers that provide stability and adaptive layers that enable change.

Managers must carefully calibrate this balance, recognizing that excessive rigidity can stifle innovation, while excessive flexibility can undermine coordination. Achieving this balance requires a nuanced understanding of ecosystem dynamics and the ability to adjust governance and coordination mechanisms in response to evolving conditions.

Future research directions

The SCIPE Framework opens several avenues for future research. Empirical validation across industries would provide insights into the framework's generalizability and applicability in diverse contexts. Longitudinal studies could examine how ecosystems evolve, focusing on the role of feedback loops in shaping adaptation processes.

Further research could also investigate the microfoundations of coordination, focusing on how individual actors interpret and respond to governance mechanisms and incentives. Additionally, comparative studies could examine differences between centralized and decentralized platform ecosystems, shedding light on how varying governance structures influence coordination outcomes.

Conclusion

This manuscript has addressed a critical gap in the literature on digital business ecosystems by proposing the SCIPE Framework, a comprehensive multi-layer architecture for managing interdependence and strategic coordination in platform networks. By integrating actor roles, interdependence structures, coordination mechanisms, governance systems, and adaptive feedback loops, the framework provides both theoretical clarity and practical guidance for navigating the complexities of non-hierarchical organizational forms.

The central insight of the SCIPE Framework is that success in platform ecosystems depends not on controlling resources but on orchestrating relationships. Interdependence, rather than independence, becomes the defining feature of strategic action, requiring firms to develop new capabilities for coordination, governance, and adaptation.

As digital ecosystems continue to expand and evolve, the ability to manage interdependence effectively will become increasingly critical. The SCIPE Framework offers a foundation for understanding and addressing this challenge, advancing both theory and practice in the study of platform-based organizations.

Acknowledgements

None

Conflict of interest

None

Financial support

None

Ethics statement

None

Received: 01 Dec 2023 Revised: 15 Jan 2024 Accepted: 01 Mar 2024
Published online: 18 March 2024

References

Costabile C. Digital platform ecosystem governance of private companies: Building blocks and a research agenda based on a multidisciplinary, systematic literature review. Data Inf Manag. 2024;8(1):100053. https://doi.org/10.1016/j.dim.2023.100053.

Song P, Xue L, Rai A, Zhang C. The Ecosystem of Software Platform: A Study of Asymmetric Cross-Side Network Effects and Platform Governance. MIS Q. 2018;42(1):121-42.

Li H, Zhang C, Kettinger WJ. Digital Platform Ecosystem Dynamics: The Roles of Product Scope, Innovation, and Collaborative Network Centrality. MIS Q. 2022;46(2):739-70.

Gawer A. Digital platforms and ecosystems: remarks on the dominant organizational forms of the digital age. Innovation. 2022;24(1):110-24. https://doi.org/10.1080/14479338.2021.1965888.

Chen L, Tong TW, Tang S, Han N. Governance and Design of Digital Platforms: A Review and Future Research Directions on a Meta-Organization. J Manage. 2024;50(1):147-84. https://doi.org/10.1177/01492063211045023.

Kretschmer T, Leiponen A, Schilling M, Vasudeva G. Platform ecosystems as meta-organizations: Implications for platform strategies. Strateg Manage J. 2022;43(3):405-24. https://doi.org/10.1002/smj.3250.

Shen L, Shi Q, Parida V, Jovanovic M. Ecosystem orchestration practices for industrial firms: A qualitative meta-analysis, framework development and research agenda. J Bus Res. 2024;173:114463. https://doi.org/10.1016/j.jbusres.2023.114463.

Costabile C, Iden J, Bygstad B. Building digital platform ecosystems through standardization: an institutional work approach. Electron Mark. 2022;32(4):1877-89. https://doi.org/10.1007/s12525-022-00552-0.

Addo A. Orchestrating a digital platform ecosystem to address societal challenges: A robust action perspective. J Inf Technol. 2022;37(1):1-20. https://doi.org/10.1177/02683962221088333.

Huber TL, Kude T, Dibbern J. Governance Practices in Platform Ecosystems: Navigating Tensions Between Cocreated Value and Governance Costs. Inf Syst Res. 2017;28(3):563-84. https://doi.org/10.1287/isre.2017.0701.

Mukhopadhyay S, Whalley J, Pandey R, Ranganathan V. Platform ecosystem research in the technology and innovation management discipline: a multi-method literature review. Benchmarking. 2024;31(5):1826-50. https://doi.org/10.1108/BIJ-09-2022-0573.

Coskun-Setirek A, Annosi MC, Hurst W, Dolfsma W, Tekinerdogan B. Architecture and Governance of Digital Business Ecosystems: A Systematic Literature Review. Inf Syst Manag. 2024;41(1):58-90. https://doi.org/10.1080/10580530.2023.2194063.

Hein A, Schreieck M, Riasanow T, Soto Setzke D, Wiesche M, Böhm M, et al. Digital platform ecosystems. Electron Mark. 2020;30(1):87-98. https://doi.org/10.1007/s12525-019-00377-4.

Mukhopadhyay S, Bouwman H. Orchestration and governance in digital platform ecosystems: a literature review and trends. Digit Policy Regul Gov. 2019;21(4):329-51. https://doi.org/10.1108/DPRG-11-2018-0067.

Zhong Q, Yang X, Wu Z. A review of value co-creation in platform ecosystems. Syst Eng Theory Pract. 2021;41(2):421-30. https://doi.org/10.12011/SETP2020-1568.

Zhang Y. Review of Research on the Platform's Ecosystem. Acad J Bus Manag. 2024;6(6):201-6. https://doi.org/10.25236/AJBM.2024.060630.

Cozzolino A. Digital platform-based ecosystems: The evolution of collaboration and competition between incumbent producers and entrant platforms. J Bus Res. 2021;130:646-57. https://doi.org/10.1016/j.jbusres.2020.07.042.

Adner R. Ecosystem as structure: an actionable construct for strategy. J Manage. 2017;43(1):39-58. https://doi.org/10.1177/0149206316678451.

Parker G, Van Alstyne M, Jiang X. Platform ecosystems: how developers invert the firm. MIS Q. 2017;41(1):255-66.

Tiwana A. Platform governance: a configurational analysis of platform leadership and complementor performance. Strateg Manage J. 2018;39(12):3123-52. https://doi.org/10.1002/smj.2953.

Rietveld J, Schilling MA. Platform competition: a systematic review of the literature and suggestions for future research. J Manage. 2021;47(6):1528-63. https://doi.org/10.1177/0149206320969791.

Jacobides MG, Cennamo C, Gawer A. Towards a theory of ecosystems. Strateg Manage J. 2018;39(8):2255-76. https://doi.org/10.1002/smj.2904.

Kapoor R. Ecosystems: broadening the locus of value creation. J Organ Des. 2018;7:12. https://doi.org/10.1186/s41469-018-0035-4.

de Reuver M, Sørensen C, Basole RC. The digital platform: a research agenda. J Inf Technol. 2018;33(2):124-35. https://doi.org/10.1057/s41265-018-0053-2.

Nambisan S, Wright M, Feldman M. The digital transformation of innovation and entrepreneurship: progress, challenges and future research. Res Policy. 2019;48(8):103773. https://doi.org/10.1016/j.respol.2019.03.018.

Autio E, Nambisan S, Thomas LDW, Wright M. Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. Strateg Entrep J. 2018;12(1):72-95. https://doi.org/10.1002/sej.1266.

Cusumano MA, Gawer A, Yoffie DB. The business of platforms: strategy in the age of digital competition, innovation, and power. MIT Sloan Manage Rev. 2019;60(4):1-10.

McIntyre DP, Srinivasan A. Networks, platforms, and strategy: emerging views and next steps. Strateg Manage J. 2017;38(1):141-60. https://doi.org/10.1002/smj.2596.

Boudreau K. Platform boundary choices & governance: opening-up while still coordinating and orchestrating. Strateg Manage J. 2017;38(12):1765-83. https://doi.org/10.1002/smj.2571.