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Innovation Coordination Across Platform Ecosystems: Managing Collective Value Creation in Digitally Networked Business Environments

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Abstract

Platform ecosystems represent a dominant organizational form in digitally networked markets, where value emerges from the coordinated interactions of a platform leader and diverse complementors rather than from hierarchical control. This theory-development article examines how innovation coordination mechanisms enable collective value creation amid tensions between actor autonomy and ecosystem-level alignment. Synthesizing insights from peer-reviewed studies, the analysis identifies gaps in existing explanations of distributed innovation processes, complementor co-innovation, and governance in dynamic digital environments. A novel conceptual framework is advanced that integrates orchestration capabilities, modular coordination structures, and feedback loops linking innovation outcomes to ecosystem evolution. Five theoretical propositions articulate causal relationships among platform governance, complementor engagement, collective value creation, and sustained innovation performance. The framework highlights how digital network effects amplify both opportunities and tensions in innovation coordination. By reframing platform ecosystems as meta-organizations that require active coordination among distributed innovation actors, the article offers a process-oriented theory of collective value creation that extends the current ecosystem and platform literature. Implications for managers emphasize adaptive governance that balances control with openness to foster co-innovation without stifling autonomy. The proposed model offers actionable pathways for orchestrating innovation in digitally networked business environments.

Keywords Ecosystem orchestration, Platform ecosystems, Innovation coordination, Collective value creation, Complementor interactions, Digital network governance

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Introduction

Digitally networked business environments have transformed how firms create and capture value, shifting from traditional firm-centric models to platform ecosystems characterized by interdependent actors operating across porous boundaries [1, 2]. Platform leaders such as those examined in pioneering studies no longer rely solely on internal R&D but instead orchestrate innovation through networks of complementors whose contributions generate collective value that no single entity could achieve

independently [3–9]. This shift introduces unique coordination challenges: innovation is distributed, asynchronous, and continually reconfigures as technologies, user preferences, and competitive pressures evolve [3, 6].

Recent scholarship underscores that platform ecosystems function as meta-organizations in which coordination mechanisms replace traditional authority structures [2, 10–16]. Unlike supply chains or alliances with clearly defined contracts, platform ecosystems rely on technological

interfaces, governance rules, and incentive alignments to channel complementor efforts toward ecosystem-wide innovation [17–19]. Collective value creation emerges from these interactions, yet it is fragile; misaligned incentives or excessive autonomy can lead to free-riding, fragmentation, or value-destroying competition among complementors [20–26].

The literature reveals persistent tensions. On one hand, platform owners must exert sufficient control to maintain architectural integrity and ensure compatibility [20, 21]. On the other hand, excessive control risks stifling the very autonomy that fuels generative innovation and rapid complementor entry [9, 10, 22, 23]. These dynamics are amplified in digitally networked markets where low marginal costs, network effects, and real-time data flows accelerate both innovation diffusion and potential conflicts [5, 7, 12]. Empirical and conceptual work published between 2017 and 2023 consistently documents that successful ecosystems—whether in mobile operating systems, e-commerce, or smart-home technologies—exhibit sophisticated coordination capabilities that align distributed innovation actors without eliminating their entrepreneurial freedom [1, 11, 15].

Despite these advances, important theoretical gaps remain. Existing frameworks adequately describe ecosystem emergence and boundary choices [18, 20] but offer limited process-level explanations of how innovation coordination actually unfolds over time to produce collective value [13, 22]. Little attention has been paid to the micro-mechanisms that reconcile autonomy with coordination or to the feedback loops through which innovation outcomes reshape ecosystem structures [3, 17]. Moreover, while governance and orchestration are frequently discussed [16, 27], integrative models linking these elements to collective value creation in digitally networked contexts are scarce.

Theoretical Foundations and Literature Synthesis

The literature on platform ecosystems and innovation has grown substantially since 2017, converging around three interrelated streams: ecosystem architecture and boundaries, coordination and governance mechanisms, and processes of collective value creation. Early foundational work established that platforms differ from traditional pipelines by creating value through external complementors whose innovations expand the ecosystem's

overall offering [18, 20]. Jacobides *et al.* conceptualized ecosystems as sets of actors that co-evolve around a focal value proposition, emphasizing alignment without full hierarchical control [18]. This perspective was extended by studies showing that platform boundary choices—deciding which activities to internalize and which to externalize—directly shape innovation trajectories [1, 20].

A second stream focuses on coordination mechanisms within these loosely coupled systems. Orchestration emerges as a central capability whereby platform leaders set standards, provide technological interfaces, and deploy governance rules to guide complementor behavior [8, 11, 21]. Hein *et al.* described digital platform ecosystems as layered architectures in which coordination occurs through both technical modularity and relational practices [8]. Empirical investigations of complementor interactions reveal that platform owners use selective incentives, data transparency, and algorithmic matching to align contributions while preserving complementor autonomy [9, 25, 27]. Governance literature further distinguishes between formal rules (e.g., review processes, IP policies) and informal norms that evolve through repeated interactions [16, 24, 28]. These mechanisms are particularly critical in digitally networked environments where rapid scaling and real-time feedback intensify coordination demands [3, 23].

Complementor-centric research highlights co-innovation dynamics. Complementors are not passive suppliers but active innovators whose contributions depend on perceived fairness and opportunity within the ecosystem [7, 25, 26]. Studies document how complementor engagement is influenced by platform openness strategies, with excessive openness risking quality dilution and excessive closure stifling creativity [9, 10, 19]. Interorganizational collaboration patterns further show that innovation coordination benefits from collaborative network centrality and shared technological standards [3, 12].

The third stream addresses collective value creation—the joint outcome that exceeds the sum of individual contributions. Value co-creation in ecosystems is portrayed as an emergent process driven by interdependencies among actors [13, 22, 28]. Autio and Thomas called for research examining the pace and mechanisms of value creation within innovation ecosystems [22]. Subsequent work links collective value to feedback loops in which successful innovations reinforce platform stickiness and attract additional complementors, creating virtuous cycles

[5, 15, 29]. However, these cycles are vulnerable to negative externalities such as congestion or misaligned incentives [6, 26].

Synthesis of the 29 references reveals both convergence and critical gaps. Scholars agree that innovation in platform ecosystems is distributed and requires active coordination [2, 4, 18], yet explanations remain fragmented across strategic, information systems, and innovation management perspectives. Few studies integrate the micro-level coordination mechanisms with macro-level collective value outcomes, and even fewer address the ongoing tensions between autonomy and control in digitally networked settings [17, 23]. Pre-2020 work laid strong conceptual foundations [16, 18, 20], while post-2020 research added empirical depth on digital-specific dynamics such as data-driven orchestration and algorithmic governance [3, 21, 27]. Nonetheless, process-oriented theories that explain how coordination mechanisms evolve to sustain collective value creation remain underdeveloped.

To clarify how prior literature fragments coordination mechanisms, Table 1 develops a typology that consolidates architectural, relational, and governance dimensions into a unified analytical structure.

Table 1. Typology of innovation coordination mechanisms in platform ecosystems

Coordination dimension	Core mechanism	Key instruments	Primary function
Architectural coordination	Modular design	APIs, SDKs, and interface standards	Enables distributed innovation through decoupling
Relational coordination	Orchestration practices	Incentives, data sharing, and community building	Aligns complementary efforts toward shared goal
Governance coordination	Formal governance	Rules, review processes, and IP policies	Ensures quality, compliance and system integrity

Governance coordination	Informal norms	Shared expectations and community standards	Enables flexible and self-regulating coordination
Data-Driven coordination	Algorithmic orchestration	Analytics, ranking systems, and feedback data	Enables real-time adjustment of ecosystem activity
Network coordination	Structural positioning	Centrality and collaboration ties	Facilitates knowledge diffusion and innovation speed

These gaps motivate the theory-development effort. The present article bridges them by conceptualizing innovation coordination as a set of dynamic, interrelated processes embedded in platform ecosystem architecture. It draws directly on the synthesized literature to propose mechanisms that address the identified limitations, thereby contributing an integrative theoretical account tailored to digitally networked business environments.

Orchestrating Distributed Innovation: Mechanisms for Collective Value Creation and Tension Resolution in Platform Ecosystem Dynamics

Building on the synthesized foundations, this section develops a process-oriented theory of innovation coordination. The theory posits that collective value creation arises from the interplay of three core mechanisms—architectural modularity, relational orchestration, and adaptive governance—that operate within digitally networked ecosystems. These mechanisms simultaneously enable distributed innovation and manage the autonomy-coordination tensions inherent to platform-based organizing. Rather than viewing coordination as a static structural choice, this perspective conceptualizes innovation orchestration as a dynamic capability through which platform leaders shape, guide, and amplify

complementor contributions while preserving ecosystem coherence.

Modular architecture and relational alignment

Proposition 1

Platform leaders who deploy modular architectural interfaces combined with selective relational orchestration will enhance complementor innovation alignment, thereby increasing the volume and quality of co-created innovations [1, 8, 9, 21].

Modular architectures reduce transaction costs and enable independent innovation by partitioning complex systems into loosely coupled components with standardized interfaces. However, modularity alone cannot ensure that independent contributions converge on collectively valuable directions. Selective relational orchestration—including targeted data sharing, incentive design, and community building—provides the strategic guidance that aligns complementor efforts with ecosystem priorities. The complementarity between technical structure and relational practice enables higher volume and quality of co-created innovations than either mechanism alone [12, 27].

Balancing formal and informal governance

Proposition 2

Adaptive governance mechanisms that balance formal rules with informal norms mitigate autonomy-coordination tensions, enabling sustained complementor engagement without eroding generative innovation [10, 16, 24, 27].

Platform ecosystems face an inherent tension: excessive autonomy yields fragmentation, while excessive coordination stifles innovation. Adaptive governance resolves this tension by balancing formal mechanisms (compatibility standards, contractual frameworks, review protocols) with emergent informal norms (shared expectations about quality, reciprocity, and collaboration). This dual structure provides the stability necessary for coordination while preserving the flexibility that enables generative innovation. The ongoing recalibration between formal and informal elements keeps governance responsive to ecosystem evolution [19, 26].

Positive feedback loops

Proposition 3

Collective value creation in platform ecosystems is amplified when coordination mechanisms create positive feedback loops between innovation outcomes and ecosystem evolution, as successful innovations attract further complementors and reinforce network effects [5, 13, 22, 29].

Value creation in platform ecosystems is not linear but recursive. Successful complementor innovations strengthen network effects, attracting new participants and expanding market opportunities. This growth generates richer data and denser interaction networks, which in turn enable more sophisticated orchestration and further innovation. Coordination mechanisms must be designed to nurture these self-reinforcing cycles rather than merely enabling isolated contributions. When effectively managed, these feedback loops convert distributed innovation into durable, escalating collective value rather than transient gains [6, 15].

Data-driven adaptation

Proposition 4

In digitally networked markets, data-driven orchestration capabilities allow platform leaders to dynamically recalibrate coordination mechanisms in response to real-time innovation signals, outperforming static governance approaches [3, 11, 23].

The digital infrastructure of platform ecosystems generates continuous, granular data on complementor behavior, innovation trajectories, and ecosystem performance. Data-driven orchestration capabilities—encompassing sensing (monitoring ecosystem activity), interpreting (translating data into strategic intelligence), and responding (adjusting mechanisms in real time)—enable platform leaders to dynamically maintain the autonomy-coordination balance. This adaptive capacity prevents small misalignments from escalating into systemic problems while enabling rapid exploitation of emergent opportunities. Static governance approaches, by contrast, accumulate misalignments that eventually require costly, disruptive interventions [7, 28].

Network centrality and incentives

Proposition 5

Complementor interactions characterized by high collaborative network centrality will accelerate distributed innovation processes when supported by transparent incentive alignment, leading to superior collective value outcomes [7, 12, 25, 28].

Collaborative network centrality—the extent to which complementors occupy hub positions in knowledge and resource flows—accelerates innovation by enabling rapid knowledge diffusion, complex multi-actor coordination, and social proof effects that guide collective attention. However, centrality alone can enable extractive behaviors if incentives are misaligned. Transparent incentive alignment—reward structures that clearly connect ecosystem-benefiting behaviors to individual outcomes—ensures that central actors use their positions to enhance rather than capture collective value. The interaction between network structure and incentive design produces superior innovation velocity and ecosystem resilience [26, 27].

Managing power asymmetries

Proposition 6

Effective innovation coordination requires explicit management of power asymmetries between platform leaders and complementors; unresolved asymmetries erode trust and diminish long-term collective value creation [6, 19, 26].

Platform leaders occupy structurally privileged positions, controlling critical resources such as user access, infrastructure, and architectural standards. While some degree of centralized authority is necessary for ecosystem coherence, unmanaged power asymmetries invite exploitation—unilateral rule changes, extractive value capture, or arbitrary enforcement—that erodes complementor trust. In response, complementors reduce relationship-specific investments, hoard knowledge, or defect to alternative platforms. Effective asymmetry management combines structural safeguards (binding commitments, participatory rule-making) with relational practices (transparent communication, consultation) that credibly constrain the exercise of platform power and sustain the trust essential for long-term collective value creation [10, 24].

These propositions collectively articulate a coherent theory wherein innovation coordination is not a static governance choice but a dynamic capability embedded in ecosystem processes. The framework advances prior work by

integrating previously separate streams—architecture, governance, and value co-creation—into a unified process model. Future extensions may test these propositions through longitudinal or comparative case studies. Yet, the conceptual foundations offered here provide a robust starting point for understanding how platform ecosystems manage distributed innovation to achieve collective value in digitally networked business environments.

To illustrate the proposed relationships, **Figure 1** presents a conceptual model of innovation coordination across platform ecosystems.



Figure 1. Dynamic coordination of distributed innovation enables self-reinforcing collective value creation in platform ecosystems

Architecting Innovation Flows in Platform Ecosystems

The foundational role of modular interfaces in distributed innovation

In the contemporary landscape of digitally enabled value creation, platform ecosystems have emerged as a dominant organizational form, distinguished by their capacity to harness the innovative potential of a vast, decentralized network of external complementors. The efficacy of this model, however, hinges critically on the underlying architecture that structures interaction and orchestrates innovation flows. Modular interfaces constitute the foundational backbone of this distributed innovation coordination. By establishing standardized, well-documented, and stable points of interconnection—such as application programming interfaces (APIs), software development kits (SDKs), and component-based architectures—platform leaders can effectively structure the pathways for external contributors to participate. This

architectural strategy enables a fundamental shift from direct managerial control to a model of structured emergence, where innovation is guided rather than dictated [1, 8, 20].

The strategic deployment of modularity serves a dual purpose. First, it dramatically reduces transaction costs associated with external innovation. By providing a clear “rules of the game,” modular interfaces minimize the need for complex, dyadic contracts, costly negotiations, and intensive oversight, thereby lowering the barriers to entry for complementors and accelerating the velocity of their contributions. Second, modularity facilitates the recombination of knowledge across network boundaries. When components are designed with standardized interfaces, novel ideas, technologies, and services developed by disparate actors can be more readily integrated, combined, and repurposed in unforeseen ways. This combinatorial potential transforms the ecosystem from a mere collection of independent actors into a generative system where innovation begets further innovation. This architectural logic directly supports the alignment mechanisms central to Proposition 1, which posits that well-defined modular architectures are a prerequisite for achieving coordinated innovation at scale. In digitally networked environments, this architectural foundation is further amplified by its inherent scalability. Complementors can dynamically plug innovations into the core platform offering without necessitating complex renegotiations or architectural overhauls. In contrast, platform owners maintain overarching architectural integrity by making selective, strategic boundary choices that define the platform's core versus its periphery [9, 21].

Relational orchestration as a catalyst for complementor alignment

While technical modularity provides the skeletal structure for interaction, the vibrant functioning of a platform ecosystem is animated by the relational fabric that binds platform leaders to their complementor networks. Relational orchestration practices extend beyond the transactional logic of modular interfaces to encompass a suite of socio-technical mechanisms designed to cultivate deeper, more resilient forms of alignment. These practices include selective and context-aware data sharing that provides complementors with valuable market insights without compromising competitive dynamics; sophisticated incentive design that moves beyond simple revenue

sharing to include recognition programs, co-marketing opportunities, and preferential access to platform resources; and community-building initiatives such as developer conferences, online forums, and co-creation workshops that foster a sense of shared identity and mutual purpose [7, 11, 25].

These relational practices are instrumental in addressing the micro-dynamics of co-innovation—the granular, day-to-day interactions that shape the trajectory of collaborative development. By creating trust-based channels for communication and feedback, platform leaders can encourage complementors to make relationship-specific investments. This involves committing resources to develop innovations that are deeply integrated with and tailored to the platform's unique affordances, rather than pursuing generic, easily portable solutions that could be deployed across competing ecosystems. Such ecosystem-specific investments create a form of mutual lock-in that, when managed transparently and equitably, reinforces alignment and reduces the risk of opportunistic behavior [12, 27]. This dynamic is captured in Proposition 5, which argues that high collaborative network centrality—a structural position where the platform leader serves as a key hub for information and resource flows—is significantly amplified by transparent relational mechanisms. This combination does not merely increase the volume of innovation activity; it elevates the velocity of innovation cycles and improves collective outcomes by ensuring that individual complementor efforts are effectively coordinated and synergistically combined within a coherent ecosystem strategy.

Adaptive governance: Navigating the autonomy-coordination paradox

A defining tension at the heart of platform ecosystem management is the need to simultaneously foster complementor autonomy—the freedom to experiment, innovate, and pursue independent value creation—while maintaining ecosystem coherence—the overarching integrity, compatibility, and strategic direction that ensures collective functionality. Governance in this context cannot be static or prescriptive; it must evolve dynamically to navigate this inherent paradox. Adaptive governance represents a sophisticated approach that combines formal, codified mechanisms with emergent, socially constructed norms to achieve this delicate balance [10, 16, 24].

Formal governance mechanisms provide the necessary foundation for stability and predictability. These include compatibility standards that ensure interoperability, intellectual property regimes that define ownership and usage rights, and review protocols that safeguard against malicious or low-quality contributions. However, relying solely on such formal rules can lead to rigidity, stifling the very innovation the ecosystem seeks to cultivate. Therefore, adaptive governance is complemented by emergent norms—informal rules and expectations that arise from repeated interactions among platform participants. These norms, which may pertain to code quality, responsiveness to user feedback, or collaborative etiquette, create a self-regulating layer of coordination that is more flexible and context-sensitive than formal rules alone [19, 26, 27].

The interplay between formal and emergent governance is crucial for mitigating the tensions articulated in Proposition 2, which concerns the risk of coordination failure, and in Proposition 6, which addresses the potential for misaligned interests between the platform owner and complementors. In practice, effective platform leaders act as dynamic governors, recalibrating their governance mix in response to real-time signals from the ecosystem. As proposed in Proposition 4, they monitor key indicators such as complementor engagement, innovation velocity, rates of technical fragmentation, and instances of free-riding. By leveraging these signals, they can adjust boundary resources, refine incentive structures, or intervene to reinforce emergent norms, ensuring that the overall governance regime remains light-touch and enabling, yet sufficiently robust to prevent the ecosystem from devolving into chaos or being undermined by opportunistic behavior [3, 23, 28].

To extend the theoretical model, Table 2 articulates the dynamic causal pathways through which coordination mechanisms translate into sustained collective value creation.

Table 2. Dynamic mechanisms linking innovation coordination to collective value creation

Mechanism	Input condition	Process dynamics	Immediate outcome
Modular architecture	Standardized interfaces +	Complementors innovate	Increased volume &

+ orchestration	selective guidance	independently but within aligned trajectories	coherent innovation
Adaptive governance balance	A combination of formal rules and informal norms	Continuous recalibration of control and flexibility	Sustainable complementor participation
Positive feedback loops	Initial successful innovations	Attraction of users and complementors via network effects	Expanded participation and innovation density
Data-driven adaptation	Real-time ecosystem data availability	Continuous sensing, interpreting, and responding	Rapid correction of misalignment
Network centrality + incentives	Dense collaboration networks with aligned rewards	Accelerated knowledge diffusion and coordination	Faster innovation cycles
Power asymmetry management	Transparent governance and constraints on platform power	Trust-building and reduced opportunism	Increased complementor investment

Feedback dynamics and the perpetuation of collective value creation

The ultimate measure of a platform ecosystem’s success lies in its capacity to generate durable collective value—a form of value co-created by the platform owner and its complementor network and which accrues to the ecosystem as a whole. This process is not linear or a one-time outcome. Still, it is sustained through a system of cyclical feedback loops in which innovation outcomes continuously reshape the underlying ecosystem structures, creating self-reinforcing cycles of growth and enhancement [5, 13, 22, 29].

The causal logic unfolds as follows: a successful innovation introduced by a complementor enhances the platform’s overall value proposition, making it more attractive to end

users. This increased user engagement, in turn, strengthens network effects, attracting more end users and potentially new complementors to the platform. The influx of new participants expands the market opportunity for all existing actors. At the same time, the initial innovation serves as a template or inspiration for subsequent innovations, creating a cascade of combinatorial development. This virtuous cycle increases platform stickiness—the degree to which users and complementors remain engaged and find it difficult to switch to a competing ecosystem—and attracts further entrants, thereby elevating the overall performance and resilience of the ecosystem [6, 15].

Proposition 3 captures the strategic imperative inherent in this dynamic. It posits that coordination mechanisms must be explicitly designed not just to enable isolated instances of co-creation, but also to actively nurture and sustain these positive feedback loops. This requires platform leaders to be attentive to how their architectural choices, relational practices, and governance decisions either amplify or dampen these cyclical dynamics. The goal is to convert the inherently distributed and often chaotic process of innovation into a durable, self-sustaining engine of collective value, rather than allowing it to produce only transient, fragmented gains. This systemic, self-reinforcing logic represents a fundamental distinction between platform ecosystems and more traditional forms of inter-organizational collaboration, such as strategic alliances or supply chains. In those traditional settings, value co-creation tends to follow a more linear, dyadic, and tightly managed path, with a lower degree of emergent, network-level amplification. The platform ecosystem model, by contrast, thrives on the non-linear, emergent, and recursively reinforcing nature of its collective innovation dynamics, making the management of feedback loops not merely a tactical concern, but a central strategic capability [4, 18].

Conclusion

The process-oriented theory developed here integrates architectural, relational, and governance mechanisms into a cohesive explanation of how innovation coordination produces collective value in digitally networked business

environments. By addressing the identified literature gaps—particularly the limited process-level accounts of autonomy-coordination tensions and feedback dynamics—the framework extends prior ecosystem and platform scholarship. It reframes platform leaders as active orchestrators of meta-organizational innovation rather than passive infrastructure providers, offering a dynamic lens on value creation that accounts for the unique affordances and risks of digital networks.

Future scholarly inquiry could usefully examine boundary conditions of the proposed mechanisms across industry contexts or explore how emerging technologies (e.g., blockchain-based governance or AI-driven orchestration) alter these coordination processes. For practitioners, the model underscores the need to invest in adaptive capabilities that balance openness with alignment, ensuring that platform ecosystems remain generative engines of collective value amid continuous technological and market evolution. This theory thus provides both a conceptual foundation for understanding innovation coordination and a practical roadmap for sustaining it in digitally networked markets.

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