DOI: 10.53469/wjimt.2025.08(12).03

The Theoretical Logic and Practical Pathways for Constructing Digital Platform Ecosystems

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Abstract: ***In the global context, with the accelerated development of the digital economy, the digital platform ecosystem has become a key organizational form to drive industrial reshuffling, co-entrepreneurship and value co-creation. Based on the theory of organizational ecosystem evolution, the theory of social exchange, and the logic of complex adaptive systems, this study constructs an integrated analytical framework that links the "underlying logic, structural contradictions, and implementation paths" in ecosystem construction. This clarifies three layers of value networks, four stages of development, and a three-dimensional driving mechanism covering technology, organization, and macro environment. Despite the growing importance of platform ecosystems, reality is constrained by structural paradoxes - the tension between technological control and openness, the misalignment between efficiency and fairness in governance, and the persistent imbalance between business goals and broader social values. To address these challenges, this study presents a systematic approach that includes modular and inclusive technology infrastructure, dynamic adaptive governance arrangements, and long-term policy mechanisms for sustainability and collaborative value creation. The findings of this study enrich existing discussions by connecting ecosystem evolution at the macro level, structural dynamics at the meso level, and behavioral interactions at the micro level. At the practical level, the study provides actionable guidance for enterprises, policymakers, and industry associations within the platform to foster inclusive, resilient, and sustainable digital platform ecosystems. In summary, this study contributes to the relevant literature in the field of digital economy governance and provides a complete roadmap of theoretical support for the development of high-quality digital ecosystems.***

Keywords: Digital platform ecosystems; Ecosystem evolution; Governance mechanisms; Digital economy; Value co-creation; Institutional arrangements; Technological enablement.

1. INTRODUCTION

The digital economy has really taken off in recent years - new technologies like 5G, artificial intelligence, and cloud computing have reshaped the "skeleton" of the global economy [1]. Now digital technology is no longer a marginal tool but a core infrastructure, transforming the industrial chain that was once connected by a single line into a network model where platforms connect and data runs. Data from the China Academy of Information and Communications Technology in 2023 shows that the scale of our digital economy exceeded 55 trillion yuan, accounting for more than 40 percent of GDP [2]. This is not just a rise in numbers, but a real change: today's digital platforms are the key hubs for industrial consolidation, collective innovation, and making money together.

This shift has brought about a change in the logic of "how to compete" - it used to be a contest between companies and supply chains, but now it's a contest between "ecosystems". The old industry's "information barrier, resource fragmentation, and slow coordination" simply cannot sustain the scale, speed, and flexibility that the digital age demands. But the digital platform ecosystem is different [3]. It combines the core platform, partners, and users into an interactive system, allowing data, technology, and knowledge to flow across boundaries. The leading e-commerce and industrial Internet platforms have long proven that this model can bring together scattered innovation resources, streamline industrial collaboration, and create new ways to make money.

While the practice has been in full swing, the theoretical research has not kept up. Academic research is now somewhat "separated": at the macro level, it only focuses on how the ecosystem evolves, regardless of the specific interactions among platforms, partners, and users; At the micro level, there are concerns about how users come in and how partners innovate, but there is no way to link these behaviors with the intermediate structure and the overall change, and it is simply impossible to explain how complex the system is. And the research is not deep enough -although it is known that digital technology is the driving force, the role of systems such as governance rules, trust mechanisms, and industry standards has not been fully explored. These systems have a direct impact on how we cooperate, exchange resources, and share benefits within the system. Without a theoretical framework that fits all these together, the research neither explains things clearly nor helps practice.

In practice, the digital platform ecosystem is stuck with three "dilemmas": one is the technical dilemma - the

platform wants to hold onto control to maintain its advantage, and also wants to open up interfaces for everyone to innovate. If it holds too tightly, it will suffocate the diversity of partners; if it holds too loosely, it may lose competitiveness and increase risks. The second is the governance contradiction - sticking to the old centralized approach, which fails to fit the diverse roles and interests of all parties in the ecosystem, and ultimately fails to manage and coordinate well. Third, value conflicts - focusing on short-term profits may go against long-term social values, sustainable development, and ecological trust. When these three "dilemmas" are put together, it shows that the ecosystem looks powerful but is actually complex and fragile.

Now all countries are taking this ecosystem as a strategic priority: Our 14th Five-Year Plan for the digital economy aims to build competitive platforms and symbiotic digital ecosystems; The EU's Digital Markets Act and Digital Services Act aim to strike a balance between innovation, equity and user protection. This indicates that digital policy has shifted from "building gay" to "managing platform ecosystems and setting rules" [4], and now there is an urgent need to find a way of "technology implementation, strategy reliability, and system compliance".

In light of these gaps and opportunities, this study seeks to develop an integrative theoretical framework that links the evolutionary logic, dynamic mechanisms, and practical pathways of digital platform ecosystem construction [5]. By combining ecosystem evolution theory, social exchange theory, and complex adaptive systems theory, the study aims to deepen theoretical understanding while providing actionable, evidence-informed guidance for firms, policymakers, and industry associations. Through this approach, the paper contributes to ongoing discussions on digital economic governance and supports the broader agenda of fostering inclusive, resilient, and sustainable digital ecosystems.

2. RESEARCH SIGNIFICANCE

The construction of digital platform ecosystems is emerging as a central topic in digital economy research, yet existing theoretical and practical frameworks remain fragmented. This study makes significant contributions in two major dimensions: theoretical advancement and practical relevance.

2.1 Theoretical Contributions

2.1.1 Integrating Fragmented Theories into a Coherent Analytical Framework

Previous studies have known that the digital platform ecosystem is important, but the academic results have largely been "each talking their own way" - either only discussing the technical architecture or only focusing on user behavior, without stranding the micro specific operations, the structure of the middle layer, and the macro changes of the entire ecosystem into a hierarchical logic [6]. This study combines the strengths of theories such as "how the organizational ecosystem evolves", "how people exchange", and "how complex systems adapt" to solve this problem. The final framework consists of three layers:

1) Evolutionary Logic:

It divides the ecosystem into four stages: incubation, growth, maturity, and iteration, and clarifies the core strategies for each stage - such as building trust at the beginning, and then expanding the circle and making governance professional when it grows and stabilizes, which fills the previous academic gap of not being able to explain "how the ecosystem changes in stages"

2) Dynamic Drivers:

Instead of insisting on "technology or market", it is said that the development of the ecosystem is the result of the combination of "the confidence given by technology, the collaboration of all parties, and institutional conditions". This is in line with the actual situation of digital platforms being complex and involving multiple parties.

3) Value Logic:

The process of exchanging data and services for revenue among the platform, partners, and users is fitted into the theory of "social exchange", which is much more dynamic and rich than the value relationship in the old model [7]. This set of rules is equivalent to laying a more solid foundation for subsequent research and explaining things more clearly.

2.1.2 Bridging Organizational Ecology and Digital Economy Research

Traditional organizational ecology studies industrial clusters with clear geographical boundaries and always assumes premises such as "proximity" and "scarcity of resources", but digital platform ecosystems have no boundaries, rely entirely on networks, and are data-driven. The old ways simply don't cover up. This study, which combines organizational ecology with the digital economy, is a step forward.

It created a model centered on "technology gives confidence, the more people in the network are willing to join, and everyone creates value together", clarifying how technology affects the evolution of the ecosystem and the behavior of all parties - for example, whether the support provided by technology is sufficient directly determines whether the partners are willing to innovate, and these innovations in turn make more people willing to join the network. In this way, it delves deeper into the ecological perspective and breaks through the limitations of traditional models.

And it defines the digital ecosystem as a "social technology system", not a mere technology or market product, so there is no need to worry about "whether technology or market has the final say", allowing for a more detailed and comprehensive view of the problem.

2.2 Practical Contributions

2.2.1 Providing Actionable Guidance for Platform Enterprises

Many platform enterprises struggle to align governance, scaling strategies, and technological decisions with ecosystem evolutionary stages. Firms may overemphasize scale expansion during early phases while neglecting trust-building, or conversely, maintain rigid governance during maturity and miss opportunities for ecosystem renewal. This study offers actionable insights: A modular and inclusive technological architecture lowers entry barriers for SzMEs and encourages “long-tail innovation.” Dynamic governance mechanisms, with differentiated strategies across lifecycle stages, help balance efficiency, equity, and adaptability [8]; Balanced commercial and social value strategies —including the integration of ESG principles—can help platforms avoid short-termism, mitigate systemic risks, and build long-term ecosystem trust. These insights translate theoretical mechanisms into concrete strategic guidance, enhancing both ecosystem stability and firm competitiveness.

2.2.2 Offering a Scientific Basis for Policy Design

Digital platform governance has become a global regulatory challenge. Policymakers must balance innovation and risk: excessive regulation may suppress digital evolution, while insufficient oversight risks data abuse, monopolistic behavior, and systemic fragility .This study provides targeted references for policy development: Supporting inclusive digital infrastructure, particularly for SMEs and underserved regions; Establishing differentiated and adaptive regulatory frameworks, such as sandbox mechanisms; Creating mechanisms for data factor circulation, fair value distribution, and security governance; Embedding sustainability and social value assessment into platform evaluation systems. These recommendations can help shift policy design toward anticipatory, adaptive governance, promoting both effective markets and effective government.

2.2.3 Enhancing High-Quality Digital Economy Development

Digital platform ecosystems serve as crucial bridges integrating digital and real economies. Their health directly influences national digital competitiveness. This study’s conceptual framework supports: Industrial upgrading through industrial Internet platforms; Service-sector innovation and public-service improvements; Reduction of the digital divide through inclusive ecosystem design; Acceleration of national strategies such as “Digital China” and industrial modernization. Thus, the study provides strategic guidance for realizing high-quality growth and fostering a resilient, innovation-driven digital economy.

3. LITERATURE REVIEW

Research on digital platform ecosystems has expanded rapidly in recent years, reflecting their critical role in shaping industrial transformation, innovation dynamics, and economic governance. Existing studies can be synthesized into three major streams:

(1) conceptualization and structural analysis,
(2) theoretical foundations, and
(3) practical challenges and construction pathways.

Despite significant progress, notable gaps remain, providing opportunities for theoretical and empirical advancement.

3.1 Conceptualization and Structural Dimensions of Digital Platform Ecosystems

The concept of digital platform ecosystems originates from the intersection of organizational ecology and digital technology research. Early scholarship focused on fundamental definitions and boundary conditions. Hein et al. (2020) conceptualize digital platform ecosystems as collaborative value networks centered on digital technologies and composed of platform providers, complementors, and users [9]. These ecosystems exhibit a "core–periphery" architecture, in which platforms design technological architecture and governance rules, complementors innovate on products and services, and users engage through content generation and feedback.

Subsequent research has expanded this conceptualization along multiple dimensions:

Technological Dimension

Tiwana (2020) emphasizes the role of modular architecture and open interfaces in enabling flexible integration between platforms and complementors [10]. Boundary resources lower innovation costs and stimulate third-party development, contributing to network expansion.

Market and Network Dimension

Drawing on two-sided market theory, Rochet, J.-C., & Tirole, J. (2021) highlight cross-side network externalities, whereby user participation on one side increases the value for participants on the other [11]. This framework explains pricing decisions, platform competition strategies, and market tipping phenomena.

Evolutionary Classification

Moore, J. F. (2022) four-stage framework—birth, expansion, leadership, and renewal—illustrates how interaction patterns evolve, from early platform–complementor cooperation to large-scale user acquisition and eventual ecosystem renewal in response to technological or market shifts. [12]

Governance Classification

Gawer, A. (2023) distinguishes between closed, semi-open, and open ecosystems. Closed ecosystems emphasize tight control, while open ecosystems prioritize developer participation and innovation variety [13].

Despite these contributions, existing studies often isolate structural elements rather than integrating technological, behavioral, and environmental dimensions. The dynamic transitions among structures—particularly how technological affordances reshape governance modes and actor interactions—remain insufficiently explored.

3.2 Theoretical Foundations for Ecosystem Construction

Research on ecosystem construction draws from multiple theoretical traditions. Three foundational perspectives are particularly influential:

Organizational Ecosystem Evolution Theory

The theory explains how ecosystems evolve through co-adaptation between organizations and environments [14]. In digital contexts, dynamic capabilities such as knowledge acquisition and resource integration are critical for transitioning from expansion to leadership. However, traditional ecological assumptions—such as geographical proximity—are less applicable in digital settings characterized by boundaryless interactions and accelerated innovation cycles. Emerging research therefore calls for integrating digital technological affordances into

ecosystem evolution models.

Social Exchange Theory

Wang, K., Tai, J. C. F., & Hu, H.-f. (2023) resource–value exchange logic has been widely applied to explain interactions among platforms, complementors, and users [15]. Case studies show that user-generated content, attention, and feedback serve as exchange resources in return for platform affordances such as visibility or social functionality. Complementors engage in technology–market exchange, receiving data access or traffic resources in return for innovation. However, most research focuses on dyadic interactions rather than triadic or multi-actor exchange networks. The ways in which user behavior simultaneously shapes platform revenue and complementor incentives remain less understood.

Two-Sided Market Theory

Gui, Y., Zhai, H., Dong, F., & Liu, Z. (2024) theory provides analytical foundations for pricing strategies and user acquisition [16]. Research shows that platforms often subsidize one side of the market (typically consumers) to attract participation on the other. However, this framework underemphasizes non-transactional value creation—such as social value, innovation spillovers, and knowledge co-production—which are central in digital ecosystems. Thus, while powerful, two-sided market theory must be complemented by additional perspectives to fully explain multi-dimensional ecosystem value creation.

Collectively, these three theories offer substantial explanatory power but have not yet been fully synthesized into a unified framework that accommodates the complexity of digital ecosystems.

3.3 Practical Challenges and Emerging Pathways in Ecosystem Construction

A growing body of research investigates the practical challenges platforms face when constructing ecosystems. These challenges cluster around three main tensions:

Technological Inequality and Limited Inclusiveness: Leading platforms often accumulate substantial technological advantages, creating high entry barriers for SMEs. Research shows that interface adaptation fees and digital transformation costs can account for over 30% of SMEs' digitalization expenses, limiting ecosystem inclusiveness. This results in technological polarization, inhibiting long-tail innovation.

Data Sovereignty vs. Efficiency in Collaboration: Studies examining cross-border data governance reveal that data localization requirements and diverse regulatory regimes increase collaboration costs by 15–20%, reducing the efficiency of global digital ecosystems. Balancing data sovereignty with innovation needs remains a critical policy and managerial challenge.

Commercial Priorities vs. Social Value: Case studies show that some platforms prioritize short-term commercial metrics such as traffic or monetization while neglecting ESG objectives, including environmental commitments, rural inclusion, and green operations [17]. These misalignments erode ecosystem trust and contribute to systemic risks.

Scholars have proposed initial strategies to address these challenges, including: modular technology architectures to reduce entry barriers; alliance governance models to enhance complementor collaboration; incentive schemes and standard-setting to promote responsible platform practices However, these approaches tend to focus on individual dimensions—technology, organization, or policy—without providing a holistic framework capable of addressing multi-dimensional, interacting tensions.

3.4 Synthesis and Research Gaps

Across the literature, three major gaps persist:

1) Insufficient Theoretical Integration: Research remains siloed across technological, organizational, and institutional perspectives. Few studies provide a comprehensive framework linking evolutionary stages, dynamic drivers, and governance strategies.

2) Limited Understanding of Multi-Dimensional Structural Tensions: Existing work insufficiently examines the interplay among inclusiveness, governance efficiency, data security, and social value. Pathways often lack contextualized guidance for real-world implementation.

3) Underutilization of Digital-Technological Affordances: Although digital technologies reshape ecosystem boundaries and actor behavior, their affordances—automation, interoperability, trust-building—are not yet fully incorporated into theoretical models.

Addressing these gaps requires an integrative, systems-oriented approach capable of linking theoretical logic with practical pathways. The next section develops such a framework by proposing a set of technology-, organization-, and environment-driven pathways for constructing sustainable digital platform ecosystems.

4. ECOSYSTEM CONSTRUCTION PATHWAYS

Building sustainable digital platform ecosystems requires moving beyond fragmented, single-dimensional approaches. Prior research often emphasizes technological tools, organizational governance, or policy mechanisms in isolation [18], which is insufficient for addressing ecosystems' multi-actor complexity and dynamic evolution. Based on ecosystem evolution theory, social exchange theory, and complex adaptive systems, this study proposes a three-dimensional system of construction pathways that incorporates technological enablement, organizational collaboration, and environmental linkage. These pathways collectively support the development of inclusive, resilient, and adaptive digital ecosystems.

4.1 Technological Enablement: From Infrastructure Provision to Capability Building

Technological enablement is widely regarded as a foundational element of platform ecosystem growth. However, ecosystems that merely provide tools without cultivating participants' operational and innovation capabilities often struggle to scale inclusively. This study therefore conceptualizes technological enablement as a progression from infrastructure provision to capability incubation, built upon principles of modularity, openness, and inclusiveness.

4.1.1 Establishing Integrated Technology Enablement Centers

Platform leaders can integrate internal and external technological resources—such as cloud computing, big data analytics, and AI—to form comprehensive technology enablement centers. These centers provide end-to-end services for SMEs, including technical diagnostics, solution design, and hands-on training. For example, industrial Internet platforms such as COSMOPlat collaborate with universities and research institutions to deliver diagnostic assessments and customized digital transformation plans for SMEs. This "teach-to-fish" approach addresses the technological polarization common in digital ecosystems, enabling SMEs to acquire data collection, analysis, and intelligent decision-making capabilities more rapidly.

4.1.2 Forming Low-Cost Technology Sharing Alliances

Complementing platform-led enablement, technology sharing alliances bring together leading technology firms, research institutions, and complementors to jointly develop open technology knowledge bases. These alliances provide low-cost licensing or open-source access to patents, algorithms, and technical modules. Open-source communities such as PaddlePaddle and TensorFlow have demonstrated that shared algorithm frameworks can significantly reduce development costs and stimulate broad-based innovation. Similarly, battery technology alliances in the new-energy vehicle sector—such as those spearheaded by CATL—accelerate industry-wide technological iteration through shared patent pools.

4.1.3 Developing Inclusive Technology Adaptation Tools

To ensure that technology diffusion benefits diverse user groups, platforms can design inclusive technology adaptation tools. These include simplified interfaces for older users, low-bandwidth content protocols for rural regions, and accessibility tools for visually impaired users. Such design principles ensure that digital participation is equitable and inclusive, aligning with the broader goals of digital inclusion and sustainable development.

4.2 Organizational Collaboration: From Rule Enforcement to Value Co-Creation

Technological solutions alone cannot sustain ecosystems; multi-actor collaboration and trust are equally essential. Traditional governance approaches—centered on static rules or contractual enforcement—often fail to accommodate the heterogeneity and dynamism of ecosystem participants. This study proposes a shift from rule-based coordination to value co-creation, emphasizing shared norms, dynamic governance, and relational cohesion.

4.2.1 Establishing Multi-Stakeholder Ecosystem Councils

Ecosystem councils composed of platform representatives, complementors, users, regulators, and industry associations can facilitate shared governance and collective value alignment. By articulating ecosystem-wide principles, these councils enhance trust and encourage long-term collaboration. Examples include sustainability councils within e-commerce ecosystems that promote green logistics, recyclable packaging, and responsible consumption. These institutions shift governance from unilateral rule-setting to collaborative stewardship.

4.2.2 Designing Dynamic Value Distribution Mechanisms

Traditional revenue distribution models—focused primarily on transactional metrics—often fail to reward long-term or socially beneficial contributions. This study proposes dynamic models incorporating both economic and social value creation, such as innovation contributions, employment generation, and environmental impact. Platforms may reward SMEs that generate employment with visibility incentives or support complementors developing green products with additional traffic and marketing resources. These mechanisms operationalize the "triple bottom line" (economic, social, environmental) within ecosystem value distribution.

4.2.3 Building Relational Communities and Co-Creation Platforms

Platforms can strengthen relational ties among ecosystem members through online co-creation workshops, offline industry summits, and community-building events. Such interactions cultivate emotional bonds, facilitate real-time feedback, and strengthen trust—factors essential for ecosystem resilience. Examples include user–merchant co-design initiatives, developer meetups in open-source communities, and hackathons designed to accelerate collective problem-solving. These relational activities complement formal governance arrangements by fostering mutual respect and shared identity.

4.3 Environmental Linkage: From Policy Compliance to Proactive Institutional Engagement

Digital platform ecosystems do not exist in isolation; they are embedded within regulatory, social, and economic environments. Effective ecosystem construction requires active engagement with these environments through policy responsiveness, cross-sector collaboration, and public value communication.

4.3.1 Establishing Dedicated Policy Response Units

Platforms can enhance compliance efficiency by forming dedicated units that monitor policy developments related to data security, antitrust, algorithm governance, and rural revitalization. These units translate policy requirements into actionable internal guidelines and offer training for ecosystem participants. For example, platforms have begun developing privacy computing toolkits to help SMEs comply with data protection laws, reducing regulatory burdens and minimizing ecosystem risk.

4.3.2 Promoting Public–Private Innovation Initiatives

Joint innovation initiatives between platforms and governments address structural challenges such as rural logistics bottlenecks, SME digitalization barriers, and regional development imbalances. Examples include county-level logistics infrastructure co-funded by platforms and governments and digital empowerment subsidies for SMEs undergoing digital transformation. These initiatives help generate positive spillovers by synchronizing public policy goals with market-driven innovation.

4.3.3 Communicating Ecosystem Impact to Strengthen Social Legitimacy

Platforms can publish sustainability reports, ecosystem development white papers, and social impact analyses to

enhance transparency and build public trust. Such communications demonstrate contributions to employment, environmental protection, rural development, and technological innovation. Increased visibility of ecosystem value not only enhances legitimacy but also attracts additional resources—capital, talent, and policy support—thus reinforcing a virtuous cycle of growth.

4.4 Synthesis: A Systemic Approach to Ecosystem Construction

The three pathways—technological, organizational, and environmental—are mutually reinforcing. Technological inclusiveness supports organizational collaboration; effective governance enhances the utility of technological investments; and policy engagement reduces systemic risks and fosters long-term sustainability. A successful digital platform ecosystem must therefore embrace systemic coordination , integrating these pathways into a coherent strategy rather than pursuing isolated optimizations.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study, based on theories of organizational ecology, social exchange, and complex systems, constructs a systematic analytical framework that integrates theoretical logic, real-world challenges, and innovative pathways. The study provides the following key conclusions:

(1) Multi-dimensional construction logic: Digital platform ecosystems exhibit a synergy of three dimensions (technology–organization–environment) and four evolutionary stages.
(2) Core practical tensions: Ecosystem development is constrained by technological inclusiveness gaps, governance inefficiencies, and commercial–social value imbalances.
(3) Integrated pathways: A comprehensive system featuring technological empowerment, organizational coordination, and environmental synergy is essential for ecosystem sustainability.

5.2 Recommendations

Based on the findings above, the following recommendations are proposed for various stakeholders involved in digital platform ecosystem construction:

5.2.1 Recommendations for Platform Enterprises

Dynamic Governance Strategy: Platform enterprises should implement governance strategies aligned with the ecosystem's lifecycle. During the cultivation phase, relationship governance and social governance should focus on building trust. In the growth stage, contract and algorithm governance should be gradually introduced to improve coordination and scale. In the maturity stage, more complex arbitration mechanisms and stakeholder committees should be incorporated to handle the diverse interests and prepare for future transitions or transformations.

Empowering Technological Architecture: Platforms should build enabling technological infrastructures and inclusive service systems. This can be achieved by standardizing API interfaces, providing low-code/no-code platforms, and creating public technological service centers that lower the barriers for smaller complementors to innovate.

5.2.2 Recommendations for Policymakers

Precision Regulation and Proactive Empowerment: Policymakers should avoid a one-size-fits-all regulatory approach and instead offer classification-based guidance depending on the platform's industry, size, and development stage. Flexible regulatory tools like "regulatory sandboxes" should be used to encourage innovation while ensuring compliance with safety standards.

Regulating Data Flow and Value Distribution: Establish clear rules for data ownership, circulation, and revenue sharing to ensure fair distribution of data-related benefits. The incorporation of Environmental, Social, and Governance (ESG) principles in platform evaluations should also be considered to guide platforms toward sustainable practices.

5.2.3 Recommendations for Industry Associations and Research Institutions

Facilitating Multi-Stakeholder Dialogue: Industry associations should play a neutral, bridging role, organizing dialogue between platform enterprises, complementors, users, and regulators. This should include regular conflict mediation and arbitration mechanisms. Moreover, associations should lead in formulating industry standards for technology interoperability, data ethics, and sustainability.

Tracking Front-End Innovations and Talent Development: Research institutions should monitor emerging technologies like Web3 and AI-generated content (AIGC) for their potential impact on platform ecosystems. They should also engage in case studies and best practices to guide the development of healthy ecosystems. Collaboration with universities and enterprises is crucial to nurture talent that understands both technological and governance aspects of the digital economy.

This translation and refinement aim to match the academic tone and structure typical of International Journal of Financial Studies, ensuring clarity, precision in technical terms, and a logical flow of ideas.

ACKNOWLEDGMENT

Project “Establishment of the China-ASEAN Computing Power Center for Building a Digital Platform Ecosystem: Theoretical Mechanisms, Empirical Verification, and Countermeasure Research” supported by Guangxi Training Program of Innovation and Entrepreneurship for Undergraduatess (Grant No. X2025106020087).

CONFLICT OF INTEREST

The authors declare no conflicts of interest relevant to this study.

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