

Postprint: A Study on Symbiotic Interest Relationships in County-Level E-commerce Based on Information Ecology Theory

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Date: 2023-10-08T00:00:00+00:00

Abstract

[Purpose/Significance] Aiming at the “small county, large ecosystem” phenomenon in the current development of county-level e-commerce, this study explores issues concerning symbiosis in county-level e-commerce, provides theoretical foundations for constructing a balanced and healthy county-level e-commerce ecosystem, and broadens the application scope of information ecology theory.

[Method/Process] Grounded in information ecology theory, this research examines the formation conditions, subjects, and characteristics of symbiotic benefits in county-level e-commerce from a symbiotic perspective, and investigates the interrelationships, stability, and durability among symbiotic benefit subjects during the development of county-level e-commerce.

[Results/Conclusion] Symbiotic benefit relationships in county-level e-commerce encompass four types: commensalism, amensalism, mutualism, and reciprocal harm. Among these relationships, symmetric mutualism within mutualism represents the most durable and stable relationship type, and constitutes a goal that county-level e-commerce practitioners should pursue.

Full Text

Research on the Symbiotic Interest Relationships of County E-commerce Based on Information Ecology Theory

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Abstract

[Purpose/Significance] In response to the “small county, big ecology” phenomenon currently observed in county e-commerce development, this paper examines issues related to county e-commerce symbiosis, providing a theoretical foundation for constructing a balanced and healthy county e-commerce ecosystem while expanding the application scope of information ecology theory. **[Method/Process]** Grounded in information ecology theory, this study investigates the formation conditions of symbiotic interests in county e-commerce, the characteristics of symbiotic interest subjects, and analyzes the interrelationships, stability, and durability among these subjects during county e-commerce development. **[Results/Conclusion]** County e-commerce symbiotic interest relationships include four types: commensalism, amensalism, mutualism, and antagonism. Among these, symmetrical mutualism represents the most durable and stable relationship type and should be pursued as an ideal goal for county e-commerce practitioners.

Keywords: county e-commerce; information ecosystem; symbiosis; interest subjects; interest relationships

Classification Number: G250

1 Introduction

Although county e-commerce remains in its primary and exploratory stages, successful development cases have already revealed certain patterns and common characteristics. Following the implementation of national e-commerce initiatives in rural areas, e-commerce development has gradually shifted toward third- and fourth-tier cities and rural regions, making county e-commerce a “new blue ocean” that enterprises are competing to capture. This paper employs information ecosystem theory to examine county e-commerce symbiotic interest relationships from a symbiotic perspective, aiming to provide decision-making recommendations for county e-commerce development.

Funding: This research is supported by the National Social Science Fund Project “Research on the Blocking and Unblocking Mechanisms of Agricultural Products Upward Mobility in Rural E-commerce Ecosystems” (Project No.: 18BGL268).

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Received: June 18, 2019

Published: February 7, 2020

Responsible Editor: Liu Yuanying

2 Information Ecology Theory and Related Research

German scholar R. Capurro first formally introduced the term “information ecology” in *Advances in Information Ecology*, conducting preliminary research on information pollution, information balance, and digital divide issues [1]. In 1995, A. L. Eryomin argued in *Ecology and Social Development* that information ecology theory represents not only a special branch of knowledge research but also an important field in information management, with its core research content drawing on natural ecology principles to explore relationships among individuals, organizations, and society, and seeking methods to optimize information environments by studying human physical and mental states and social welfare [2]. In 1998, American scholar B. A. Nardi noted in “Information Ecologies” that information ecology constitutes an organic whole comprising people, behaviors, values, and technology within a specific environment [3].

China’s information ecology discipline began in the 1990s and has since developed into an independent field with over two decades of history. Academician Zhang Xinshi first proposed the concept of information ecology in *A New Branch of Ecology in the 1990s—Information Ecology* in 1990 [4]. Lu Jianbo et al. also explored definitions of information ecology in their book *Information Ecology* [5]. Chen Shu conducted systematic research on information ecology issues, publishing three papers between 1995 and 1996—“Information Ecological Imbalance and Balance” [6], “Analysis of Information Ecological Imbalance” [7], and “Information Ecology Research” [8]—shifting the research focus from single ecological entities to the comprehensive relationships among information, people, and information environments. Li Meiti examined the basic elements, functions, and structures of information ecosystems in “Analysis of Information Ecosystems” [9]. These four papers represent early domestic research on information ecology. Scholars such as Wang Weiyun [10], Tian Chunhu [11], and Hu Yunqing [12] all view information ecology as the totality of relationships among information, people, and information environments. Wang Xiwei et al. [13] consider information ecology a discipline that employs ecological theory to study information management. Lou Cequn et al. [14] argue that early research on “information ecology” actually belonged to the category of “ecological informatics,” while the proper research object of “information ecology” should be information ecosystems.

Lou Cequn and his research team have conducted extensive studies across numerous information ecology domains, including information ecological chains, information ecological balance, and information flow, producing substantial academic output [15-20]. Jilin University’s Zhang Xiangxian [21-25] and Jing Jipeng’s team [26-30] have also undertaken significant research in information ecology. Other scholars have introduced theories from other disciplines: Fu Rongxian [31] and Cong Jingjun et al. [32] approached information ecology from a philosophical perspective, studying disciplinary construction, research methods, and

principles; Liu Zhifeng et al. [33] applied lifecycle theory to information ecosystem research; Li Beiwei's team [34-36] utilized game theory to study the evolution processes and mechanisms of network information ecological chains; Chen Weidong [37] and Ma Jie [38] employed system dynamics to investigate the mechanisms and optimization of network information ecosystems and social network information ecological chains. These efforts have advanced the development and subdivision of information ecology while refining its theoretical framework.

Lou Cequn's team has conducted in-depth research on information person symbiosis within information ecosystems, analyzing its causes, patterns, and benefits [39]. A few scholars have examined symbiotic patterns in county e-commerce: Bai Yanzhuang et al. proposed typologies for county e-commerce symbiotic development [39]; Yang Shilong studied the operational mechanisms of China's county e-commerce "large ecosystem" from a value co-creation perspective [40]; Zhang Ying identified characteristics of rural e-commerce symbiotic models and relationships within symbiotic system structures [41]; Lei Bing and Zhong Zhen proposed conceptual models and symbiotic relationships for rural e-commerce ecosystems [42]; Yang Jiameng and Zhang Zhiguang explored symbiotic patterns based on transaction frequency and symbiotic interest relationships [43]; Zhang Miaomiao et al. studied the formation mechanisms and optimization strategies of symbiotic interests in police intelligence sharing, offering reference value for analyzing interest relationships among stakeholders in symbiotic structures [44-45]. However, few scholars have conducted in-depth analysis of mutual interest relationships among symbiotic individuals, particularly within specific industries and regions. This paper draws on information ecology theory to analyze interest relationships arising from symbiosis among various subjects in current rural and county e-commerce ecosystems, examining whether these relationships can be sustained and exploring their influencing factors, thereby offering both innovation and practical significance.

3 Subjects and Formation Conditions of County E-commerce Symbiotic Interest Relationships

In his book *Information Ecosystem Theory and Application*, Professor Lou Cequn argues that the necessary conditions for information person symbiosis include: a common interface, resources available for exchange and sharing, and similar or identical survival demands [9]. Accordingly, the formation of county e-commerce symbiotic interest relationships requires the following conditions:

1. **Common Interface:** County e-commerce interest subjects coexist within the same county development environment, sharing spatial-temporal conditions, material foundations, and policy frameworks.
2. **Resources for Exchange and Sharing:** Due to geographical constraints, county e-commerce entities primarily rely on local resources, forming e-commerce industrial chains based on local agricultural special-

ties and advantageous industries through resource sharing and mutual complementarity.

3. **Similar or Identical Survival Demands:** Interest subjects in county e-commerce share common interests—specifically, the need for survival and development of the county economy.

The interest subjects in information ecosystems consist of information producers, information transmitters, information consumers, and information regulators [9]. Information producers include two categories: first, e-commerce enterprises, third-party platforms, and third-party institutions such as logistics and finance; second, information consumers who are themselves information producers and constitute the core unit of information generation. Information transmitters include e-commerce training departments and information collection departments, serving as auxiliary information units for e-commerce symbiotic development. Information consumers are the broad user base, representing active participants in e-commerce symbiotic structures and the information consumption unit. Information regulators include governments and e-commerce associations, which provide policy and financial support as guarantors of normal county e-commerce operations. All these interest subjects must operate within specific natural, economic, political, and cultural environments, as illustrated in Figure 1 [Figure 1: see original paper].

4 Types of County E-commerce Symbiotic Interest Relationships

In information ecology theory research, scholars generally identify parasitic, commensal, and mutualistic symbiotic interest relationships. However, this paper argues that parasitic relationships, being beneficial to only one party, can be categorized under commensalism. Additionally, beyond these relationships, there exists a mutually harmful relationship that scholars rarely mention. Synthesizing current county e-commerce models such as the “Suichang Model,” “Shaanxi Wugong Model,” “Chengxian Model,” and “Jilin Tongyu Model,” this paper proposes four types of symbiotic interest relationships among information subjects during county e-commerce development: commensalism, amensalism, mutualism, and antagonism.

4.1 Commensal Interest Relationships

Commensal interest relationships benefit one enterprise without affecting the other, comprising parasitic and one-sided commensal relationships. Since parasitic relationships only benefit the parasite without significantly impacting the host, this paper considers parasitism a special form of commensalism.

4.1.1 Parasitic Interest Relationships In county e-commerce, some information subjects depend on others for survival, with their development contin-

gent on the host's growth. Parasitic relationships primarily benefit the parasite without affecting the host, manifesting prominently when dominant industries create industrial chains during county e-commerce development. Supporting enterprises in these chains serve large host enterprises. For example, the nationally renowned "Taobao Village"—Dongfeng Village in Shaji Town, Suining County, Xuzhou—hosts over 10,000 online merchants. By September 2016, the village's online furniture sales had fostered 73 logistics companies, 24 photography enterprises, 3 e-commerce operation agencies, 70 raw material suppliers, 36 hardware accessories enterprises, 42 mattress processing factories, 12 carton factories, and 14 accounting service companies. These supporting enterprises are parasites serving the online merchant hosts, particularly large ones.

4.1.2 One-Sided Commensal Interest Relationships One-sided commensal interest relationships benefit only one party, typically observed when well-established local offline enterprises expand into online channels under the "Internet Plus" environment. During initial online channel development, losses may be sustained, with robust offline financial strength supporting online growth, creating a one-sided beneficial symbiotic model.

4.2 Amensal Interest Relationships

Amensal interest relationships harm one party without affecting the other, primarily arising from specialized division of labor and enterprise influence within the industry. Uneven value distribution from post-division collaboration makes relatively disadvantaged enterprises appear "harmed." For instance, governments provide preferential policies including loans, tax incentives, and rewards to promote county e-commerce development. However, these policies carry conditions; enterprises failing to meet them experience policy effects as amensal, while others remain unaffected.

4.3 Mutualistic Interest Relationships

Mutualistic interest relationships represent "win-win" scenarios where enterprises mutually promote and develop each other, with two or more parties gaining benefits. This represents the direction county e-commerce should pursue. Based on benefit distribution equity, these relationships can be categorized as "asymmetrical mutualism" and "symmetrical mutualism."

4.3.1 Asymmetrical Mutualistic Interest Relationships Asymmetrical mutualistic interest relationships occur when information persons in county e-commerce ecosystems establish various cooperative relationships due to specialized division of labor, creating new value-added benefits for all symbiotic units. However, differences in reputation, status, and contractual relationships among interest subjects lead to uneven benefit distribution, favoring certain parties. For example, enterprises of different scales, statuses, and types in county e-

commerce industrial parks may receive different benefits, though all gain advantages such as rent and property fee concessions during initial entry.

4.3.2 Symmetrical Mutualistic Interest Relationships Symmetrical mutualistic interest relationships, also called integrated symbiosis, occur when various information interest subjects not only benefit mutually but also obtain equitable benefits. Absolute symmetrical mutualism does not exist as it represents an idealized state, yet some relationships approximate it, such as production-marketing integration symbiosis, logistics-enterprise production-marketing integration, and shared warehousing logistics. These subjects achieve business scope expansion and production scale enlargement through industrial chain extension, thereby maximizing benefits.

4.4 Antagonistic Interest Relationships

Antagonistic interest relationships harm both parties, representing negative-sum situations where subjects mutually consume each other. This is the least desirable relationship, characterized by opposition and conflict. For example, vicious competition between two online merchants involving relentless price reductions below cost results in mutual destruction, harming both parties.

5 Durability and Stability Analysis of County E-commerce Symbiotic Interest Relationships

The durability and stability of relationships among county e-commerce interest subjects are dynamic, continuously adjusting with self-development and environmental changes. Therefore, analyzing the durability and stability of different symbiotic interest relationship types and clarifying the benefits or conflicts among subjects is necessary.

5.1 Durability and Stability of Different Relationship Types

County e-commerce symbiotic interest relationships are generally non-durable and unstable, capable of mutual transformation and change. For instance, commensal relationships can evolve into mutualistic ones, amensal relationships can develop into commensal ones, and parasitic relationships can evolve into mutualistic ones, as illustrated in Figure 2 [Figure 2: see original paper].

5.1.1 Commensal Interest Relationships Commensal relationships exhibit relatively higher durability and stability compared to amensal and antagonistic relationships. However, since both parasitic and one-sided commensal relationships benefit only one party, they lack balance and cannot remain stable or durable over time, gradually breaking down.

(1) Parasitic Relationships: Parasitic relationships, where one party's survival depends on another, are inherently unstable and non-durable long-term. Host enterprises can always seek alternative partners, while competitive parasites continuously emerge to replace existing ones. Therefore, for long-term survival and development, parasitic enterprises must establish core competitiveness that hosts depend on and cannot easily replace, thereby transforming into mutualistic relationships.

(2) One-Sided Commensal Relationships: One-sided commensal relationships, benefiting one party without affecting the other, are relatively more stable and durable than parasitic relationships. However, with only one beneficiary between two interest subjects, long-term sustainability is impossible. Evolution toward mutual benefit is necessary for durability. For example, traditional enterprises establishing online sales channels may initially operate at a loss, subsidized by offline sales. However, enterprises will not tolerate perpetual online losses and will steer toward profitability, after which online and offline channels mutually support each other for win-win outcomes.

5.1.2 Amensal Interest Relationships Amensal relationships, harming one party without affecting the other, represent the least stable symbiotic interest relationship. Nevertheless, their objective existence motivates the harmed party to strive for growth and development, securing more advantages and benefits in resource allocation to transform “harm” into “harmlessness” or even “benefit,” thereby achieving more durable development.

5.1.3 Mutualistic Interest Relationships Mutualistic relationships, benefiting both parties, represent the generally pursued direction and are relatively stable and durable. However, asymmetrical and symmetrical mutualism differ in durability and stability. Asymmetrical mutualism, though beneficial to both parties, involves uneven benefit distribution, making its stability and durability weaker than symmetrical mutualism. In the long term, the ideal state for county e-commerce information person symbiosis is symmetrical mutualism—the most durable and stable relationship and a hallmark of mature county e-commerce ecosystems that should be advocated and pursued.

5.1.4 Antagonistic Interest Relationships Antagonistic relationships are the least advocated due to inherent opposition and conflict, making them the most unstable and non-durable. Mutual consumption and harm will eventually terminate, either through voluntary cessation when both parties recognize the futility, leading to cooperative win-win transformation, or through third-party (government or association) intervention to end mutual harm and seek cooperation.

5.2 County E-commerce Symbiotic Interest Relationship Matrix

Based on the above analysis, we can construct a county e-commerce symbiotic interest matrix, as shown in Table 2. Among these interest subjects, some share consistent interests, some have conflicts, and some exhibit both consistency and conflict.

Table 2 Matrix Analysis of Interest Relationships Among County E-commerce Information Person Symbiosis Subjects

(Note: V indicates interest consistency, X indicates interest conflict)

Healthy development of county e-commerce ecosystems should avoid interest conflicts and shift toward interest alignment. For example, online merchants may have competitive relationships with conflicting interests, yet they can also achieve win-win cooperation. In Dongfeng Village, Shaji Town, online merchants jointly purchase raw materials, process wood, and ship goods together, achieving economies of scale, reducing costs, and forming cooperative win-win entities that seek benefits and avoid harm. Interest consistency between online merchants and customers manifests when selling products benefits merchants while satisfying customer needs. Their conflict lies in merchants wanting higher prices while customers prefer lower prices—a persistent contradiction. However, merchants can sell products cheaper than market rates while remaining profitable by producing and selling directly without inventory, eliminating intermediary channels and reducing costs, thereby achieving interest consistency.

6 Conclusions and Recommendations

Based on information ecology theory, this paper examines the subjects and formation conditions, relationship types, and durability/stability of county e-commerce symbiotic interest relationships, providing theoretical reference for the healthy development and virtuous cycle of county e-commerce ecosystems. The study concludes that county e-commerce symbiotic interest relationships are dynamic and evolving. As county e-commerce ecosystems develop, interest subjects will inevitably seek benefits and avoid harm, with relationships shifting toward positive directions. Symmetrical mutualism represents an idealized yet achievable relationship type that enables long-term stability. For healthy county e-commerce ecosystem development, this paper proposes: (1) Fully leverage local resource advantages, vertically and horizontally integrate symbiotic units, encourage collaborative and industrial chain-based development, and avoid isolated operations; (2) Encourage entrepreneurship among farmers and returning college students, strengthen e-commerce talent cultivation, foster rural e-commerce groups of various scales, and advocate diversified development; (3) Promote fair, civilized, and healthy development concepts, establish comprehensive e-commerce development policies and systems, and prevent unethical vicious competition; (4) Emphasize the roles of government, e-commerce as-

sociations, and service enterprises, fully leveraging their advantages in county e-commerce development.

References

- [1] CAPURRO R. Towards information ecology[C]//WORMELL I. Information quality, definitions and dimensions. London: Taylor Graham, 1990: 122-139.
- [2] ERYOMIN A L. Ecology and society's development[C]//1st International conference. Saint Petersburg: Center of IAESVS, 1995.
- [3] NARDI B A. Information ecologies[J]. Reference & user services quarterly, 1998(4): 49-50.
- [4] ZHANG Xinshi. A new branch of ecology in the 1990s—information ecology[J]. Biological Science Information, 1990(3): 101-103.
- [5] LU Jianbo, YANG Jingping. Information ecology[M]. Beijing: Chemical Industry Press, 2005: 4.
- [6] CHEN Shu. Information ecological imbalance and balance[J]. Information and Documentation Services, 1995(4): 11-14.
- [7] CHEN Shu. Analysis of information ecological imbalance[J]. Shandong Library Quarterly, 1995(4): 4-7.
- [8] CHEN Shu. Information ecology research[J]. Library and Information, 1996(2): 12-19.
- [9] LOU Cequn. Information ecosystem theory and application[M]. Beijing: China Science Press, 2014.
- [10] HU Yunqing. Research on information ecological environment issues[J]. Library Work and Study, 2007(4): 48-51.
- [11] TIAN Chunhu. Preliminary exploration of information ecology issues[J]. Journal of Intelligence, 2005(2): 90-92.
- [12] WANG Weiyun, ZHANG Hansheng. Research on information ecology construction in harmonious society[J]. Information Studies: Theory & Application, 2007(6): 728-730.
- [13] WANG Xiwei, LI Guoce, LIU Duo. Research on enterprise knowledge organization in information ecological environment[J]. Information Studies: Theory & Application, 2010, 33(10): 49-52.
- [14] LOU Cequn, GUI Xiaomiao, YANG Xiaoxi. Conceptualization of information ecology discipline construction in China[J]. Information Science, 2013, 31(2): 13-18.
- [15] LOU Cequn, FANG Sheng, SONG Wenji. Strategies for co-evolution of network information ecological chains[J]. Library and Information Service, 2015, 59(22): 27-32.
- [16] LOU Cequn, PANG Liang, LOU Dong. Strategies for resource sharing in network information ecological chains[J]. Library and Information Service, 2015, 59(22): 12-18.
- [17] LOU Cequn, HAN Yanfang, ZHANG Junying. Research on formation mechanism of network information ecological chains[J]. Research on Library

Science, 2015(17): 2-6, 40.

[18] LOU Cequn. Theoretical exploration of information ecological niche[J]. Document, Information & Knowledge, 2006(5): 23-27.

[19] CHEN Wenjuan, LOU Cequn. Influence mechanism and adjustment strategies of information ecological niche breadth[J]. Information Studies: Theory & Application, 2011, 34(6): 4-7.

[20] LOU Cequn, ZHAO Guiqin. Information ecological balance and its role in building a harmonious society[J]. Information Science, 2006(11): 1606-1610.

[21] ZHANG Xiangxian, ZHANG Xu, ZHENG Xu. Research on construction of e-commerce information ecosystem[J]. Library and Information Service, 2010, 54(10): 20-24.

[22] JING Jipeng, MA Feicheng, ZHANG Xiangxian. Intelligence science theory[M]. Beijing: Science Press, 2013.

[23] ZHANG Xiangxian, GENG Rongna, LI Kun. Research on operational mechanism of business website information ecological chains[J]. Information Studies: Theory & Application, 2012, 35(8): 17-20, 38.

[24] ZHANG Xiangxian, LIU Hongyu, HU Yi. Empirical study on formation mechanism and influencing factors of social network information ecological chains[J]. Library and Information Service, 2014, 58(16): 36-41.

[25] ZHANG Xiangxian, GUO Jia, MA Jie. Research on information collaboration patterns in enterprise information ecosystems[J]. Information Studies: Theory & Application, 2010, 33(4): 10-13.

[26] JING Jipeng. Preface to research on formation mechanism and evolution laws of network information ecological chains[J]. Library and Information Service, 2013, 57(15): 39.

[27] JING Jipeng. Prospects for development of information ecology theory research[J]. Library and Information Service, 2009, 53(4): 5-7.

[28] LI Beiwei, JING Jipeng, WANG Junmin, et al. Research on evolution process of information ecology communities[J]. Information Studies: Theory & Application, 2010, 33(4): 1-5.

[29] WANG Xiwei, JING Jipeng, LIU Mingyan, et al. Empirical research on construction of information ecology model in e-commerce[J]. Library and Information Service, 2009, 53(22): 134-138.

[30] ZHANG Xiangxian. Review of current status of information ecology research in China[C]//Proceedings of the 13th Annual Conference of China Information Economics Society. Beijing: China Information Economics Society, 2008: 107-112.

[31] FU Rongxian. Principles and methods of information ecology research[J]. Journal of the National Library of China, 2010, 19(1): 48-53.

[32] CONG Jingjun, WANG Xuedong. Research on theoretical system and discipline construction of information ecology[J]. Information and Documentation Services, 2009(3): 25-29.

[33] LIU Zhifeng, ZHANG Zhiyu, WANG Shilei. Research on information ecosystem from perspective of life cycle theory[J]. Science and Technology Management Research, 2009, 29(4): 133-135, 138.

[34] LI Beiwei, DONG Weiwei, FU Jinxin. Research on network information

- ecological chains based on evolutionary game theory[J]. Library and Information Service, 2012, 56(22): 102-106.
- [35] XIAO Jing, LI Beiwei. Research on evolution process of network information ecological chains based on evolutionary game theory[J]. Information Studies: Theory & Application, 2014, 37(3): 36-40.
- [36] LI Beiwei, DONG Weiwei. Research on evolution mechanism of network information ecological chains based on evolutionary game theory[J]. Information Studies: Theory & Application, 2013, 36(3): 15-18.
- [37] CHEN Weidong, WANG Ping, WANG Yicheng. Research on operational mechanism model and optimization strategies of network information ecosystem based on system dynamics[J]. Modern Intelligence, 2017, 37(7): 9-13.
- [38] MA Jie, HU Mo, WEI Aoxi. Research on operational mechanism and optimization strategies of social network information ecological chains based on system dynamics[J]. Library and Information Service, 2016, 60(4): 12-20.
- [39] BAI Yanzhuang, ZHAO Xueguang, ZHANG Chunqing. Analysis of county e-commerce development models based on symbiosis theory[J]. Henan Science, 2016, 34(8): 1323-1327.
- [40] YANG Shilong. Research on operational mechanism of China's county e-commerce "large ecosystem"—Based on value co-creation theory[J]. Journal of Sichuan University of Science & Engineering (Social Sciences Edition), 2016, 31(3): 60-69.
- [41] ZHANG Ying. Research on rural e-commerce business models and their evolution[J]. Commercial Economic Research, 2017, 6(6): 161-163.
- [42] LEI Bing, ZHONG Zhen. Research on structure and symbiotic relationships of rural e-commerce ecosystem[J]. Science Technology and Industry, 2017, 17(11): 1-7.
- [43] YANG Jiameng, ZHANG Zhiguang. Research on symbiotic patterns of e-commerce ecosystem[J]. E-commerce, 2014(2): 15-16.
- [44] ZHANG Miaomiao, BI Dayu, LOU Cequn. Research on interest formation mechanism and optimization strategies in police intelligence sharing[J]. Library and Information Service, 2016, 60(14): 38-41.
- [45] ZHANG Miaomiao, BI Dayu, LOU Cequn. Research on symbiotic interests and formation in police intelligence sharing[J]. Journal of Intelligence, 2016, 35(8): 38-41.

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Xiao Liping: Responsible for data collection, writing, and revision; **Lou Cequn:** Responsible for guiding topic selection, research framework design, and theoretical guidance; **Lei Bing:** Responsible for paper revision and improvement.

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.