Post-imprinted Enterprise Knowledge Coupling under Balanced Ambidextrous Innovation Strategy

Authors: Lu Yanqiu, Song Chang, Wang Xiangyang

Date: 2023-04-01T16:02:54+00:00

Abstract

[Purpose/Significance] This study investigates the process, mechanism, and safeguard of enterprise knowledge coupling under the ambidextrous innovation balance strategy, providing a new perspective for promoting enterprise knowledge innovation. [Method/Process] Based on knowledge coupling and ambidextrous innovation theory, we construct a knowledge coupling model grounded in the ambidextrous innovation balance strategy, reveal the mechanism of knowledge coupling, and propose safeguard measures for enterprise knowledge coupling. [Results/Conclusions] Both original domain knowledge and new domain knowledge are crucial factors for enterprise knowledge innovation. The enterprise knowledge coupling process comprises four stages: knowledge search, knowledge association, knowledge fusion, and knowledge storage. The balance between original domain knowledge coupling and new-old domain knowledge coupling is key to achieving knowledge innovation under the ambidextrous innovation strategy.

Full Text

Preamble

Enterprise Knowledge Coupling Under Ambidextrous Innovation Balance Strategy Lu Yanqiu, Song Chang, Wang Xiangyang

School of Management, Jilin University, Changchun 130022

Abstract: [Purpose/Significance] This study examines the process, mechanism, and safeguards of enterprise knowledge coupling under an ambidextrous innovation balance strategy, providing a new perspective for promoting enterprise knowledge innovation. [Method/Process] Based on knowledge coupling and ambidextrous innovation theory, we construct a knowledge coupling model grounded in ambidextrous innovation balance strategy, reveal the knowledge

coupling mechanism, and propose safeguard measures for enterprise knowledge coupling. [Result/Conclusion] Both original domain knowledge and new domain knowledge are crucial factors for enterprise knowledge innovation. The enterprise knowledge coupling process comprises four stages: knowledge search, knowledge association, knowledge fusion, and knowledge storage. The balance between original domain knowledge coupling and new-old domain knowledge coupling is key to achieving knowledge innovation under an ambidextrous innovation strategy.

Keywords: ambidextrous innovation balance strategy; knowledge coupling process; knowledge coupling mechanism; industrial internet platform

Classification Number: F270

In the digital information era, knowledge accessibility has significantly increased, and leveraging digital technology to drive knowledge innovation represents an inexorable trend for enterprises. Following consumer internet platforms, enterprise-centered industrial internet platforms have integrated digital technology with corporate innovation and production, helping to enhance innovation quality and efficiency [1]. However, the current digitalization level of Chinese industrial enterprises remains generally low, making research on knowledge innovation within the industrial internet platform context valuable for improving Chinese industrial enterprises' innovation capabilities. While digital technology empowers enterprise innovation, it also intensifies market competition. With limited resources, enterprises face difficult choices between short-term innovation strategies for survival and long-term strategies for development. In practice, numerous enterprises have made erroneous decisions leading to business failure. Successful market players consistently adjust the proportion of different innovation strategies according to environmental changes, making the adoption of an ambidextrous innovation balance strategy that balances short-term incremental and long-term breakthrough innovation a critical prerequisite for sustained innovation [2]. Moreover, strategy implementation is as important as strategy formulation for achieving strategic objectives. Many enterprises fail strategically despite adopting an ambidextrous innovation balance strategy due to poor implementation and weak grasp of the knowledge innovation process. Therefore, studying knowledge coupling under the ambidextrous innovation balance strategy within the industrial internet platform context holds practical significance for enhancing enterprise innovation capabilities and competitiveness.

Current research on knowledge coupling has made progress but still exhibits limitations. First, existing studies primarily focus on inter-organizational knowledge coupling within innovation networks, with little attention to knowledge coupling under a single enterprise's ambidextrous innovation balance strategy [3-6]. Research on knowledge coupling in innovation networks emphasizes knowledge transfer among different knowledge actors, whereas knowledge coupling under an ambidextrous innovation balance strategy focuses on the micro-process of new knowledge creation. Consequently, existing research inadequately explains

the knowledge coupling process in this context. Second, most studies treat knowledge coupling as a whole without analyzing its constituent stages [7-9]. Unclear stage division hinders in-depth investigation of each stage's mechanism and prevents opening the "black box" of the coupling process. Third, existing research lacks consensus on knowledge coupling dimension classification and offers limited investigation of interactions among different dimensions [10-12]. This deficiency prevents effective guidance for knowledge innovation practice under an ambidextrous innovation balance strategy.

Research on ambidextrous innovation balance strategy and its influence on knowledge innovation processes holds practical significance for enhancing enterprise competitiveness. Enterprise innovation involves numerous knowledge branches, and studying innovation processes requires acknowledging differences arising from inter-domain variations. This necessitates a dynamic model that integrates and reconstructs knowledge across different domains to transform the knowledge base and achieve innovation—namely, knowledge coupling. In summary, this paper constructs an enterprise knowledge coupling model within the industrial internet platform context, drawing on knowledge management and ambidextrous innovation theory. Following the "knowledge search—knowledge association—knowledge fusion—knowledge storage" paradigm, we explore the knowledge coupling model and mechanism and propose safeguard measures to help enterprises leverage industrial internet platforms to improve knowledge management and enhance market competitiveness.

Author Biographies: Lu Yanqiu (ORCID: 0000-0002-4853-2837), Professor, Postdoctoral Fellow, Doctoral Supervisor; Song Chang (ORCID: 0000-0003-2755-0769), Doctoral Candidate, Corresponding Author, E-mail: 374347548@qq.com; Wang Xiangyang (ORCID: 0000-0001-6240-2249), Professor, Postdoctoral Fellow, Doctoral Supervisor.

Received: 2020-11-25 **Revised:** 2021-02-23 **Pages:** 61-70 **Responsible Editor:** Du Xingye

---

1. Related Concepts and Theory

1.1 Knowledge Coupling Concept

Knowledge coupling refers to the process in which knowledge elements from two or more technical domains integrate, permeate, and interconnect through mutual interaction to form new knowledge [13]. Knowledge coupling reflects enterprises' actions to associate and combine knowledge across different technical domains, exhibiting subjective and dynamic characteristics. Existing research classifies knowledge coupling based on knowledge types, with knowledge management literature offering three primary classifications: (1) by knowledge source, such as external versus internal knowledge or individual versus organizational knowledge; (2) by knowledge attributes, such as explicit versus tacit knowledge

or homogeneous versus heterogeneous knowledge; and (3) other domain-specific classifications, such as scientific, market, and supply chain knowledge based on specialization [14]. Knowledge coupling research primarily focuses on knowledge across different domains, emphasizing analysis of distinct domain characteristics and their effects during the coupling process. Within industrial internet platforms, enterprises can access both industry-specific domain knowledge and cross-industry new domain knowledge. Drawing on Yayavaram et al.'s research, this paper categorizes knowledge involved in coupling as original domain knowledge and new domain knowledge. Original domain knowledge belongs to the same or similar domains as the enterprise's existing knowledge, while new domain knowledge originates from entirely different domains.

Classification of knowledge coupling based on knowledge types remains inconsistent in existing research. Yao Yanhong et al. classify knowledge coupling as complementary or substitutive based on enterprise-owned knowledge [15], ignoring knowledge domain attributes. Yu Fei et al. propose classification by knowledge domains: coupling within the original knowledge domain and coupling between new and old domains [16]. The former refers to new knowledge creation through knowledge coupling within existing business domains, while the latter involves introducing new domain knowledge to couple with existing domain knowledge for new knowledge creation. This study adopts Yu Fei's classification to investigate the processes and mechanisms of these two knowledge coupling types.

1.2 Ambidextrous Innovation Balance Strategy

To adapt to complex and dynamic market environments, enterprises must develop ambidextrous capabilities—the ability to seize current opportunities while making correct judgments about the future [17]. The former relies on incremental innovation, while the latter depends on breakthrough innovation. Ambidextrous innovation balance strategy refers to strategic activities where enterprises simultaneously pursue incremental and breakthrough innovation, seeking complementary effects between the two innovation types to achieve sustained innovation [18]. Compared with single innovation strategies, ambidextrous strategic combinations highlight the synergistic and complementary relationship between incremental and breakthrough innovation, facilitating knowledge innovation. Most existing literature supports the ambidextrous balance strategy perspective (Uotila et al. [19], He et al. [20]), emphasizing that enterprises must balance short-term survival and long-term development [21].

The balance between incremental and breakthrough innovation manifests in two forms: interaction and matching [22]. First, the interaction effect means the two types mutually promote innovation implementation. Incremental innovation enables enterprises to continuously exploit new knowledge and technologies generated through breakthrough innovation, establishing and strengthening competitive advantages in new markets. Simultaneously, accumulated knowledge and technology from incremental innovation help enterprises identify new directions

and increase breakthrough innovation success rates, thereby positively reinforcing breakthrough innovation effects. Conversely, new skills or knowledge from breakthrough innovation can be applied to existing markets, improving incremental innovation efficiency and effectiveness. Thus, breakthrough innovation also supports and promotes incremental innovation. Second, the matching effect concerns how the proportion between the two innovation types affects innovation outcomes. Existing research shows that focusing exclusively on either innovation strategy may hinder innovation activities, so enterprises should balance internal weights within the ambidextrous innovation strategy to avoid falling into "failure traps" or "success traps" due to imbalance. However, the effectiveness of ambidextrous innovation balance strategy primarily depends on the enterprise's knowledge innovation process, making research on different knowledge types and their balancing mechanisms during innovation crucial.

---

2. Enterprise Knowledge Coupling Under Ambidextrous Innovation Balance Strategy

2.1 Knowledge Coupling Process

This paper employs literature research to analyze knowledge coupling-related achievements and explore the enterprise knowledge coupling process. The coupling principle was first applied by K.E. Weick to explain economic phenomena [23] and later extended to knowledge management. As previously stated, knowledge coupling aims at knowledge innovation. Knowledge search serves as an important antecedent influencing knowledge acquisition and utilization to promote knowledge innovation [24]; therefore, this paper considers knowledge search as the prerequisite for knowledge coupling. S. Yayavaram [13] notes that universal interdependence exists among knowledge elements, and coupling degree reflects knowledge synergy. Building on this, S. Yayavaram and W. Chen [9] propose that knowledge coupling represents the connection degree between knowledge elements from two domains—stronger logical relationships yield stronger coupling. G.H. Wang and L.Y. Yu similarly argue that knowledge coupling depends on knowledge matching degree [25]. Thus, knowledge association constitutes a crucial coupling stage, with association effects influencing coupling outcomes, as Wu Huawei et al. also demonstrate using regional economic data [26].

As a practical form of knowledge innovation, knowledge coupling's core stage is new knowledge creation. Considering the highly abundant knowledge sources in industrial internet platforms, this core stage should meet requirements for creating new knowledge through aggregating and reasoning various knowledge types [27], which aligns with knowledge fusion functions. Broad knowledge fusion encompasses not only the fusion process but also the pre-fusion stage involving knowledge merging and unification [28], functionally consistent with knowledge association's encoding and categorization. Therefore, the knowledge association stage lays the foundation for knowledge fusion. The knowledge fusion stage

achieves knowledge innovation, enriching the enterprise knowledge base. Enterprises select knowledge from this base to solve specific problems [29]. Moreover, knowledge entering the base can participate in new coupling cycles as internal knowledge, supporting enterprise knowledge search. Consequently, knowledge storage represents the final stage of the knowledge coupling process. Figure 1 [Figure 1: see original paper] illustrates the enterprise knowledge coupling process.

2.2 Knowledge Coupling Model Construction Under Ambidextrous Innovation Balance Strategy

According to strategic innovation theory, enterprises adjust innovation strategies in response to environmental changes, achieving survival and development through dynamic balance between incremental and breakthrough innovation. As the practical process of ambidextrous innovation balance strategy, knowledge coupling extends its internal interaction and matching effects. Following the ambidextrous innovation classification, this paper divides the knowledge coupling process under ambidextrous innovation balance strategy into dual processes: original domain knowledge coupling and new-old domain knowledge coupling. Original domain knowledge coupling involves closely related, homogeneous knowledge that promotes improvements in existing products and services, playing a vital role in achieving incremental innovation strategic goals. Conversely, new-old domain knowledge coupling involves collisions and combinations between external new domain knowledge and existing knowledge, enhancing single knowledge's value or effect [30]. With greater knowledge distance, new-old domain knowledge coupling optimizes the enterprise's knowledge base, helps explore new business spaces, and achieves breakthrough innovation strategic goals. To deeply investigate how different knowledge coupling types affect knowledge innovation, H.H. Chen et al. recently empirically studied the impact of these two coupling types on exploratory and exploitative innovation [12].

The knowledge search stage, guided by ambidextrous innovation strategic needs, seeks and acquires knowledge from different domains, involving both external environment and internal knowledge base knowledge. The knowledge association stage unifies this knowledge according to ambidextrous innovation goals, forming corresponding association sets. Internal knowledge provides alternative association objects, improving association effects and laying the foundation for knowledge fusion. The knowledge fusion stage, as the core coupling stage, creates new knowledge based on ambidextrous innovation goals through integrated transformation and derivative processing of existing knowledge, forming new knowledge sets. The ultimate goal of knowledge innovation is application, and knowledge storage provides the platform for post-innovation knowledge application. New knowledge 沉淀 s back into the enterprise knowledge base after internal application, supporting strategic decision-making, knowledge search, and association options. External sharing creates new external knowledge through other entities' innovation processes, becoming sources for subsequent coupling

cycles. Internal and external knowledge updates thus establish the foundation for new coupling cycles. Figure 2 [Figure 2: see original paper] presents the knowledge coupling model under ambidextrous innovation balance strategy.

---

3. Enterprise Knowledge Coupling Under Ambidextrous Innovation Balance Strategy

This section aims to explore the micro-process of enterprise knowledge coupling under ambidextrous innovation balance strategy. Through literature review and analysis, we construct a knowledge coupling model under ambidextrous innovation balance strategy, dividing the knowledge coupling process into stages to lay the foundation for further mechanism investigation.

3.1 Knowledge Search Stage

Knowledge search refers to strategic behaviors where enterprises effectively select and successfully acquire external knowledge sources amid environmental changes. This paper divides the knowledge search stage into original domain knowledge search and new domain knowledge search. The fluctuating digital information era intensifies market competition, making environmental change perception and innovation strategy adjustment the first steps toward knowledge innovation. Enterprises then search for and acquire external knowledge based on innovation needs. Leveraging industrial internet platforms, enterprises can expand knowledge sources to include upstream/downstream firms, lead users, academic institutions, government agencies, and cross-domain partners, providing multi-domain knowledge resources. These resources enter enterprises through external interaction ports, are digitized and stored in enterprise knowledge bases, and are temporarily classified as original or new domain knowledge based on enterprise-owned knowledge standards.

Enterprise strategic needs not only influence knowledge search objectives but also extend their ambidextrous balance to the knowledge search stage, requiring balance between original and new domain knowledge search through interaction and matching effects. Regarding interaction effects, original domain knowledge search incurs lower costs, facilitating external knowledge absorption and promoting qualitative transformation through continuous quantitative accumulation [31]. New domain knowledge search prevents myopia from domain fixation, introduces heterogeneous knowledge, and promotes new product development [32]. Original domain knowledge search enhances existing knowledge stock and levels, providing foundations and direction for new domain search. Conversely, new domain search expands search scope, increasing original domain search space and providing more channels for acquiring related knowledge. Regarding matching effects, original and new domain knowledge search must maintain proportional balance. Excessive original domain search creates “core rigidity,” lacks new knowledge, reduces opportunities for new domain search, diminishes envi-

ronmental change awareness, and increases innovation uncertainty risks. New domain search targets are relatively dispersed; over-implementation causes target loss and high search costs due to broad scope. Therefore, only by reasonably balancing dual knowledge search weights can enterprises optimize interaction effects, acquire more external knowledge, and create foundations for knowledge innovation. Figure 3 [Figure 3: see original paper] illustrates the knowledge search stage mechanism under ambidextrous innovation balance strategy.

3.2 Knowledge Association Stage

Knowledge association refers to relationships and connections among knowledge elements, representing the behavior and state of making implicit associations explicit due to internal or external logical connections in knowledge management and innovation activities. Continuing the dual classification from the search stage, knowledge association divides into original domain and new-old domain knowledge association, corresponding consistently with search results. Knowledge obtained through search varies in source and level, with knowledge granularity differences typically manifested in users, texts, topics, and terms. Both same-granularity and cross-granularity knowledge exhibit complex relationships, creating obstacles for knowledge association [33]. Therefore, the primary step in knowledge association is unifying knowledge unit structures, extracting themes and classifying multi-granularity knowledge, then encoding these heterogeneous categories to form structured knowledge across dual domains, including structured, semi-structured, and unstructured knowledge. After unified classification and encoding, knowledge association employs logic-based algorithms to calculate relationships, making logical connections explicit.

Logical relationships can be categorized as explicit or implicit. Explicit logic primarily involves classification and causality, while implicit logic manifests as high-frequency co-occurrence [34]. Association algorithms are set based on these logical relationships, with common types including affiliation, intersection, co-occurrence, and coupling relationships [35]. Original domain knowledge association involves close knowledge distance, mainly comprising affiliation and co-occurrence associations. New-old domain knowledge association involves distant knowledge, primarily comprising intersection and coupling associations.

Consistent with the dual balance effects in the search stage, knowledge association's dual balance manifests through interaction and matching effects. Interaction effects enable original domain association to expand basic algorithms' scope and accumulate experience for new-old domain association algorithm development. New-old domain association explores new algorithm effects and expands space for original domain association algorithms. Regarding matching effects, excessive focus on one association type reduces the other's effectiveness, weakening interaction effects and undermining subsequent coupling stages' dual balance foundation. Therefore, enterprises should balance original and new-old domain knowledge association weights to achieve optimal effects. Figure 4 [Figure 4: see original paper] illustrates the knowledge association stage mechanism.

3.3 Knowledge Fusion Stage

Mainstream literature defines knowledge fusion as more than simple multi-source heterogeneous data integration, with the most significant characteristic being new knowledge generation [36]. Most knowledge fusion research adopts a knowledge element perspective, converting various knowledge types into knowledge elements as the fusion foundation, then using algorithms and rules to fuse them into usable new knowledge [37]. Drawing on this approach, this paper divides knowledge fusion into pre-fusion, fusion, and post-fusion stages. The pre-fusion stage aims to form uniformly standardized valid meta-knowledge sets through knowledge acquisition and standardization, realized in the knowledge search and association stages. Valid knowledge elements enter the fusion process, interacting and permeating based on fusion algorithms that undergo comparison, merging, and coordination to achieve integrated transformation. Fusion algorithms, supported by digital technology, constitute key support and guarantee for knowledge fusion, with mainstream methods including Bayesian methods and D-S evidence theory. Fusion algorithms are influenced by fusion rules, which are determined by innovation needs derived from enterprise strategic objectives. Thus, enterprise innovation strategy clarifies innovation needs, which determine fusion rules, influence fusion algorithms, and ultimately affect the core knowledge fusion stage. The post-fusion stage organizes and manages new knowledge, which enters the knowledge space after stable precipitation and testing.

New knowledge's specific application attributes remain immature at this stage. Based on innovation needs, derivative knowledge processing forms new knowledge sets meeting innovation requirements, including original domain and new-old domain fusion products. Consistent with previous stages' dual balance effects, knowledge fusion's dual balance also manifests through interaction and matching effects. Interaction effects primarily optimize the fusion rule library: original domain fusion strengthens existing rules and explores new ones, while new-old domain fusion expands new rules and guides existing rule development. Matching effects require balancing original and new-old domain fusion weights to avoid weakening interaction effects and failing to meet ambidextrous innovation strategic knowledge needs. Figure 5 [Figure 5: see original paper] illustrates the knowledge fusion stage mechanism.

3.4 Knowledge Storage Stage

Existing literature has thoroughly studied knowledge storage, such as dividing knowledge transformation cycles into storage, activation, and transformation stages, where knowledge storage refers to adding and preserving new knowledge used by individuals, teams, or organizations in existing knowledge units [38]. Original domain knowledge fusion primarily generates incremental innovation knowledge, while new-old domain fusion mainly produces breakthrough innovation knowledge. Knowledge storage represents the final coupling stage, where newly formed knowledge enters enterprise storage systems and gradually

assimilates into enterprise-owned knowledge, enriching the knowledge base and expanding the knowledge foundation. Enterprise knowledge storage systems can be divided into physical storage and organizational memory [39]. Physical storage stores knowledge in visible physical media like files, computers, and databases, constituting explicit knowledge. Organizational memory resides in individual, team, or organizational cognition and experience, representing cumulative knowledge sets acquired through learning and constituting tacit knowledge. Explicit storage has become the primary new knowledge storage method due to its convenience, while tacit storage requires organizational learning.

Consistent with previous stages' dual balance effects, knowledge storage's dual balance manifests through interaction and matching effects. Interaction effects show that incremental innovation knowledge involves smaller leaps from existing knowledge, enabling rapid spiral ascent between explicit and tacit knowledge [41] and faster innovation frequency. Storing incremental innovation knowledge facilitates continuous knowledge base expansion, accumulating knowledge for breakthrough innovation. Breakthrough innovation knowledge involves larger leaps and slower innovation frequency but can expand new space for the knowledge base, opening new paths for incremental innovation. The complementary relationship between knowledge span size and innovation frequency ensures steady knowledge innovation development. Matching effects require balancing incremental and breakthrough innovation knowledge storage weights to avoid weakening interaction effects and failing to meet ambidextrous innovation strategic needs. Figure 6 [Figure 6: see original paper] illustrates the knowledge storage stage mechanism.

---

4. Enterprise Knowledge Coupling Safeguard Measures

Enterprise knowledge coupling via industrial internet platforms does not occur in isolation but is embedded in internal and external environments. Factors influencing knowledge coupling exist not only within the process but also in pre- and post-coupling environments. To ensure smooth knowledge coupling, this paper proposes safeguard measures from three perspectives: external relationships and internal strategy before coupling, digital empowerment during coupling, and intellectual property protection after coupling.

Pre-coupling factors primarily include external knowledge actors and enterprise innovation strategy. As main knowledge sources, ensuring smooth knowledge channels with these actors is crucial for maintaining external knowledge availability. Specifically, enterprises should: (1) build carriers connecting external knowledge actors, such as establishing innovation alliances, digital platforms, and online communities to enhance cooperation; and (2) establish internal-external knowledge sharing mechanisms based on equality and mutual benefit to strengthen knowledge transfer willingness. Regarding enterprise innovation strategy, as previously discussed, ambidextrous innovation balance strat-

egy ensures sustained innovation. Specifically, enterprises need: (1) effective innovation strategy decision-making systems that guide knowledge innovation according to environmental changes; and (2) strengthened implementation and supervision to ensure complete, orderly innovation processes.

The four coupling stages have distinct functions: knowledge search focuses on acquiring massive heterogeneous knowledge; knowledge association emphasizes unified encoding and correlation analysis; knowledge fusion centers on developing and applying fusion rules and algorithms; and knowledge storage focuses on rapidly integrating new knowledge into enterprise knowledge systems. These challenges reflect digital-era knowledge management characteristics—leveraging digital technology to develop and utilize massive, diverse, heterogeneous knowledge. Therefore, digital technology empowerment is crucial. As the optimal carrier for embedding digital technology in enterprise innovation, industrial internet platforms' functional construction facilitates digital empowerment, such as building multi-channel online knowledge interaction ports, multi-actor collaborative innovation networks, and distributed knowledge storage and sharing. Additionally, enterprises should adopt innovation-friendly organizational structures and mechanisms that clarify responsibilities and authorities for internal employees and external partners, activating micro-actor effectiveness across coupling stages and promoting target achievement.

Post-fusion stages primarily involve new knowledge application. In competitive digital markets, commercially valuable new knowledge is fundamental for maintaining competitiveness, requiring effective intellectual property protection systems. First, establish dedicated intellectual property departments with internal and external functions: external maintenance and internal management of intellectual property. Second, develop suitable intellectual property systems to regulate related behaviors and strengthen protection internally and externally. Finally, enhance employee intellectual property awareness through laws and regulations to prevent knowledge loss from personnel turnover. In summary, establishing an intellectual property system is crucial for safeguarding innovation application efficiency and reducing redundant innovation pressure.

---

5. Conclusion and Outlook

Implementing an ambidextrous innovation balance strategy is an important pathway for enterprises to achieve sustained innovation. This paper analyzes the knowledge innovation process from the enterprise knowledge coupling perspective, innovatively proposes a knowledge coupling model under ambidextrous innovation balance strategy, explores mechanism differences between original domain and new-old domain knowledge coupling, and extends research on safeguard mechanisms. Key conclusions include:

(1) Enterprise knowledge coupling comprises four stages: knowledge search, knowledge association, knowledge fusion, and knowledge storage. The

knowledge search stage enables enterprises to absorb external heterogeneous multi-domain knowledge through modern digital technology, innovation alliances, and user communities. The knowledge association stage encodes acquired knowledge, uses association algorithms to identify potentially innovative combinations, and forms the basis for knowledge fusion. The knowledge fusion stage drives further penetration of associated knowledge, producing new knowledge meeting innovation goals through fusion algorithms. The knowledge storage stage integrates newly generated knowledge into enterprise storage systems, continuously expanding the knowledge base through explicit-tacit knowledge interaction.

(2) Based on differences in knowledge sources, we classify coupling between external and enterprise-owned knowledge into original domain and new-old domain knowledge coupling, exploring their distinct processes and effects. Original domain knowledge coupling involves external knowledge similar to enterprise-owned knowledge, with close knowledge distance, small leaps, and support for incremental innovation (e.g., product upgrades). New-old domain knowledge coupling involves external knowledge substantially different from enterprise-owned knowledge, with distant knowledge distance, large leaps, and support for breakthrough innovation (e.g., new product development).

(3) Integrating the ambidextrous innovation balance strategy process, we construct a knowledge coupling model that embeds interaction and matching effects throughout knowledge search, association, fusion, and storage stages. This dual effect extends throughout the entire coupling process, optimizing each stage's effectiveness and ensuring strategy implementation.

Limitations remain: Theoretically, while our internal knowledge coupling model offers insights for knowledge management theory, it emphasizes theoretical exploration. Future research should quantitatively analyze strategy change impacts on knowledge coupling and apply the model to enterprise case studies for validation and optimization. Practically, although we address digital technology's role in process, mechanism, and safeguards, we have not deeply embedded the coupling process within industrial internet platforms' physical architecture. Future research should strengthen interdisciplinary integration between knowledge management and information engineering to better serve enterprise innovation practice.

References

[1] Lv Wenjing, Chen Jin, Liu Jin. Industrial internet's intelligent manufacturing model and enterprise platform construction: A case study of Haier Group [J]. China Soft Science, 2019(7): 1-.

[2] Jin Xin, Chen Song, Shao Jungang. Multi-dimensional impacts of ambidextrous innovation strategy and organizational dynamic capabilities on firm performance [J]. Forecasting, 2019, 38(1): 30-36.

[3] Wu Yanbo. Research on the relationship between alliance portfolio configuration, knowledge coupling, and enterprise innovation capability [D]. Chengdu: University of Electronic Science and Technology, 2020.

[4] Wang Wenjing, Zhang Wei. Collaborative innovation effects of industry-university knowledge coupling: Based on an innovation system perspective [J]. China Science and Technology Forum, 2019(7): 61-68.

[5] Cummings JL, Teng BS. Transferring R&D knowledge: The key factors affecting knowledge transfer success [J]. Journal of Engineering and Technology Management, 2003, 20(1/2): 39-68.

[6] Szulanski G, Cappetta R, Jensen RJ. When and how trustworthiness matters: Knowledge transfer and the moderating effect of causal ambiguity [J]. Organization Science, 2004, 15(5): 600-613.

[7] Yu Fei, Hu Zemin, Dong Liang, et al. Research on the influence mechanism of knowledge coupling on enterprise breakthrough innovation [J]. Science Research Management, 2018, 36(12): 2292-2304.

[8] Yi Biyi, Zeng Li. Research on knowledge coupling collaborative innovation model: The case of OpenNASA [J]. Science Research Management, 2020, 41(5): 231-239.

[9] Yayavaram S, Chen WR. Changes in firm knowledge couplings and firm innovation performance: The moderating role of technological complexity [J]. Strategic Management Journal, 2015, 36(10): 2735.

[10] Yao Yanhong, Zhang Cuiping. Knowledge domain coupling, knowledge innovation capability, and enterprise innovation performance: The moderating role of environmental uncertainty and strategic flexibility [J]. Science and Technology Progress and Policy, 2019, 36(23): 76-84.

[11] Yu Fei, Hu Zemin, Yuan Shengjun. Opening the black box between institutional pressure and enterprise green innovation: The mediating role of knowledge coupling [J]. Forecasting, 2020, 39(2): 1-9.

[12] Chen HH, Yao YH, Zhou HP. How does knowledge coupling affect exploratory and exploitative innovation? The chained mediation role of organizational memory and knowledge creation [J]. Technology Analysis & Strategic Management, 2020, 11: 15.

[13] Yayavaram S, Ahuja G. Decomposability in knowledge structures and its impact on the usefulness of inventions and knowledge-base malleability [J]. Administrative Science Quarterly, 2008, 53(2): 333-362.

[14] Chuan Peng, Lin Chunpei, Zhang Zhengang, et al. Specialized knowledge search, management innovation, and firm performance: The moderating role of

cognitive evaluation [J]. Management World, 2020, 36(1): 146-166, 240.

[15] Yao Yanhong, Ge Zheyu, Zhou Huiping. Knowledge coupling in innovation networks, organizational memory, and enterprise innovation performance [J]. Soft Science, 2018, 32(8): 38-42.

[16] Yu Fei, Liu Mingxia, Wang Lingfeng, et al. Influence mechanism of knowledge coupling on manufacturing enterprises' green innovation: The moderating role of redundant resources [J]. Nankai Business Review, 2019, 22(3): 54-65, 76.

[17] Leana CR, Barry B. Stability and change as simultaneous experiences in organizational life [J]. Academy of Management Review, 2000, 25(4): 753-759.

[18] Benner MJ, Tushman ML. Reflections on the 2013 decade award-"Exploitation, exploration, and process management: The productivity dilemma revisited" ten years later [J]. Academy of Management Review, 2015, 40(4): 497-514.

[19] Uotila J, Maula M, Keil T, et al. Exploration, exploitation, and financial performance: Analysis of S&P 500 corporations [J]. Strategic Management Journal, 2009, 30(2): 221-231.

[20] He ZL, Wong PK. Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis [J]. Organization Science, 2004, 15(4): 481-494.

[21] Yang Xueru, Li Xinchun, Liang Qiang, et al. Does balancing exploitative and exploratory innovation necessarily improve firm performance? [J]. Journal of Industrial Engineering and Engineering Management, 2011, 25(4): 17-.

[22] Zhang Feng, Qiu Wei. Mechanisms and balance of exploratory and exploitative market innovation [J]. Management Science, 2013, 26(1): 1-13.

[23] Weick KE. Educational organizations as loosely coupled systems [J]. Administrative Science Quarterly, 1976, 21(1): 1.

[24] Ye Jiangfeng, Chen Shan, Hao Bin. How does knowledge search affect firm innovation performance? Research review and prospect [J]. Foreign Economics & Management, 2020, 42(3): 17-34.

[25] Wang GH, Yu LY. Differential game analysis of scientific crowdsourcing on knowledge transfer [J]. Sustainability, 2019, 11(3): 377-396.

[26] Wu Huawei, Wang Chao, Xu Haiyun, et al. Research on evaluation methods for regional science-technology-industry collaborative innovation level from a knowledge coupling perspective [J]. Information Studies: Theory & Application, 2020, 43(5): 91-98, 8.

[27] Liu Xiaojuan, Li Guangjian, Hua Bolin. Knowledge fusion: Conceptual analysis and definition [J]. Library and Information Service, 2016, 60(13): 13-19, 32.

[28] Tang Xiaobo, Zhu Juan, Yang Fenghua. Research on a knowledge fusion framework model in big data environments [J]. Library Science Research,

2016(1): 32-35, 18.

[29] Ye Yingping, Lu Yanqiu, Xiao Yanhong. Construction of a knowledge innovation model based on network embedding [J]. Library and Information Service, 2017, 61(7): 102-110.

[30] Yao Yanhong, Xie Min, Ge Zheyu. Impact of knowledge domain coupling in collaborative networks on enterprise ambidextrous innovation [J]. East China Economic Management, 2019, 33(7): 120-127.

[31] Hu Pan, Yu Bo. Boundary-spanning search, capability reconfiguration, and firm innovation performance: The moderating role of strategic flexibility [J]. R&D Management, 2017, 29(4): 138-147.

[32] Wu Hang, Chen Jin. External knowledge search and firm innovation performance: A new theoretical framework [J]. Science of Science and Management of S.&T., 2015, 36(4): 143-151.

[33] Xiao Lu, Zhao Zhihui, Chen Guo. Multi-knowledge association mining in network communities from a global perspective [J]. Library and Information Service, 2020, 64(6): 100-107.

[34] Li Xuhui, Fan Meihui. Knowledge association in big data [J]. Information Studies: Theory & Application, 2019, 42(2): 68-73, 107.

[35] Gao Jiping, Ding Jun, Pan Yuntao, et al. Review of knowledge association research [J]. Information Studies: Theory & Application, 2015, 38(8): 135-140.

[36] Zhu Xiang, Zhang Yunqiu. Recent progress and trends in knowledge fusion research [J]. Library and Information Service, 2019, 63(16): 143-150.

[37] Suo Chuanjun, Gai Shuangshuang. Research on knowledge element connotation, structure, and description model [J]. Journal of Library Science in China, 2018, 44(4): 54-72.

[38] Carlile PR, Rebentisch ES. Into the black box: The knowledge transformation cycle [J]. Management Science, 2003, 49(9): 1180-1195.

[39] Zhang Li, Tian Yezheng, Qi Zhongying. Research on a knowledge-based organizational memory framework [J]. Information Science, 2005, 23(9): 1297-1301.

[40] Yun Jiang, Wang Wenjing. Organizational memory, improvisational capability, and strategic change [J]. Nankai Business Review, 2015, 18(4): 36-46, 105.

[41] Peng Zhiqiang, Liu Junna, Liu Yajie. Patent management improvement strategies from the SECI knowledge spiral perspective [J]. China Invention & Patent, 2019, 16(9): 53-60.

Author Contributions: Lu Yanqiu: Proposed research proposition and designed paper framework; Song Chang: Wrote paper, drew and revised figures; Wang Xiangyang: Revised and proofread paper.

Enterprise Knowledge Coupling Under the Role of Ambidextrous Innovation Strategy Balance Lu Yanqiu Song Chang Wang Xiangyang School of Management, Jilin University, Changchun 130022

Abstract: [Purpose/significance] This paper studies the process, mechanism and safeguards of enterprise knowledge coupling under the ambidextrous Innovation strategy balance, which provides a new perspective for promoting the enterprise knowledge innovation. [Method/process] Under the knowledge coupling and ambidextrous Innovation theory, a knowledge coupling process model based on ambidextrous Innovation strategy balance was constructed, the mechanism of knowledge coupling was clarified, and the safeguard measures were put forward. [Result/conclusion] Both the original domain knowledge and the new domain knowledge are important factors in the knowledge innovation. The internal knowledge coupling is divided into four stages: knowledge search, knowledge association, knowledge fusion and knowledge storage. The balance between the original domain knowledge coupling and the new domain knowledge coupling is the key to realize knowledge innovation.

Keywords: ambidextrous innovation strategy balance; knowledge coupling process; knowledge coupling mechanism; industrial Internet platform

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