

Research on Collaborative Mechanism of E-commerce Industry Chain Driven by Market Allocation of Data Elements

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Abstract: In the strategic context of establishing a new development paradigm, the high-quality development of e-commerce—a core engine of the digital economy—heavily relies on the efficient market allocation of data elements and the deep synergy of the industrial chain. Integrating resource allocation theory and value co-creation theory, this paper systematically analyzes the internal mechanism through which market-oriented data element allocation drives e-commerce industrial chain synergy. It innovatively constructs a five-dimensional synergy framework comprising "platform leadership, factor circulation, technology empowerment, ecological co-construction, and governance guarantee", embedding the core professional competencies (e.g., market research, data analysis, supply chain management, platform operation) specified in the National Vocational Skills Standard for E-commerce Engineers (Level-II). The research indicates that: (1) Data property rights confirmation/registration, efficient circulation and trading, technological innovation and application, and institutional safeguards constitute the key pathways to industrial chain synergy; (2) Platform enterprises integrate ecological resources and alleviate operational pain points for SMEs through open empowerment and rule-based governance; (3) Government-guided cluster governance mechanisms (e.g., the "chain chief system") significantly facilitate the digital transformation and ecological synergy of industrial clusters; (4) Intelligent decision-making algorithms (e.g., for demand forecasting and resource scheduling) and privacy-enhancing technologies serve as the core pillars of technology empowerment. Accordingly, countermeasures are proposed, providing theoretical support and practical pathways for enhancing the synergy efficiency of the e-commerce industrial chain and fostering the high-quality development of the digital economy.

Keywords: Data Elements; E-Commerce; Industrial Chain Coordination; Platform Enterprises; Market Allocation

1. Introduction

China is currently accelerating its transition toward a new development pattern characterized by a dual-circulation framework, where the domestic cycle serves as the mainstay while domestic and international cycles mutually reinforce each other. As a critical nexus linking production to consumption and integrating online with offline channels, e-commerce has emerged as a central driver of high-quality economic growth^[1]. Amid the deepening integration of artificial intelligence (AI), cloud computing, and big data, data has gained prominence as a new factor of production. The efficiency of its market-oriented allocation directly influences the operational effectiveness and synergistic performance of the e-commerce industrial chain.

Nevertheless, several practical challenges to synergy persist. Data silos across upstream and downstream segments of the industrial chain, ambiguous data ownership, high barriers to circulation, and insufficient trust mechanisms collectively inhibit the full realization of data value. Although major e-commerce platforms—exemplified by Alibaba's "data mid-platform + business mid-platform" and JD.com's "smart supply chain" system—have pioneered data-driven collaborative models, systematic theoretical research in this area remains underdeveloped, particularly regarding how market-based allocation mechanisms can resolve collaboration dilemmas.

Furthermore, the competency requirements for e-commerce engineers are undergoing significant transformation. The National Vocational Skill Standard for E-Commerce Engineers (2021 Edition)

stipulates that professionals ranked Level-II and above must possess capabilities in data analysis, platform operation, supply chain coordination, and project management^[2]. This underscores that data-driven industrial chain synergy entails not only technical and institutional considerations but also necessitates the enhancement of talent competencies.

In light of these issues, this study addresses the core question of “how market-driven data element allocation facilitates e-commerce industrial chain synergy.” We aim to develop a theoretical mechanism framework and propose actionable policy recommendations aligned with professional standards, thereby contributing to both theoretical innovation and practical guidance.

2. Market Allocation of Data Elements: Theoretical Foundations, Value, and Challenges

2.1 Basic Connotation and Theoretical Basis

The market-oriented allocation of data elements refers to the process whereby the value of data resources is discovered, confirmed, priced, traded, circulated, and transformed through market mechanisms under secure and compliant conditions^[3]. It essentially constitutes an institutional arrangement for organizing and utilizing data—a factor of production characterized by non-rivalry and partial excludability.

Grounding in property rights theory, which asserts that clearly defined data ownership is a prerequisite for market transactions, China’s exploration of a “tripartite rights separation” mechanism—encompassing data resource holding rights, data processing rights, and data product operation rights—offers an institutional foundation for data element marketization^[4]. From the perspective of information economics, data circulation mitigates information asymmetry within industrial chains, thereby enhancing resource allocation efficiency. Value co-creation theory further suggests that the flow and integration of data facilitate the formation of cross-organizational value networks.

2.2 Strategic Value for E-commerce Development

2.2.1 Breaking down Data Silos and Enabling Holistic Insights

Market-driven allocation promotes data interconnectivity among upstream and downstream enterprises within and beyond platforms, enabling a comprehensive view of consumer behavior, supply chain status, and market dynamics. Data from the Ministry of Commerce indicates that e-commerce enterprises practicing data sharing have improved their supply chain responsiveness by an average of 30%^[1].

2.2.2 Optimizing Resource Allocation and Enhancing Operational Efficiency

Market-based price signals direct data flows to high-value applications such as precision marketing, flexible production, and smart logistics. For instance, inventory strategies informed by consumption forecasts can substantially alleviate the bullwhip effect.

2.2.3 Stimulating Innovation and Catalyzing New Business Models

Data elements serve as the foundation for innovative approaches such as C2M reverse customization, supply chain finance, and intelligent recommendation systems. According to Alibaba Research Institute (2022), over 60% of e-commerce product innovations originate from data-driven consumer insights.

2.2.4 Improving Synergy and Strengthening Systemic Resilience

Data sharing supports collaborative decision-making in areas such as joint forecasting, coordinated inventory replenishment, and risk early warning, thereby enhancing the overall resilience of the industrial chain. A JD.com case study demonstrates that data collaboration can increase inventory turnover rates by more than 50%.

2.3 Practical Challenges

The market-oriented allocation of data elements faces multi-dimensional obstacles in practice, and its core challenges can be summarized from four dimensions: institution, circulation, security, and ecology, with specific manifestations shown in Table 1.

Table 1: Main Challenges of Market-oriented Data Element Allocation

Challenge Dimension	Specific Manifestations
Institutional Imperfections	Lagging legislation on data property rights confirmation, ambiguous transaction rules, lack of standardized valuation and dispute resolution mechanisms.
Circulation Barriers	Lack of uniform technical standards, inconsistent data quality, insufficient trust mechanisms for transactions, difficulties in cross-platform interoperability ^[5] .
Security and Privacy Risks	Frequent data leakage and misuse, challenges in regulating cross-border data flows, rising compliance costs ^[6] .
Immature Market Ecosystem	Underdevelopment of data suppliers, demanders, and intermediaries; low market liquidity and transaction activity.

3. Theoretical Framework and Driving Mechanism of E-commerce Industrial Chain Synergy

3.1 The Connotation: From Linear Cooperation to Networked Value Creation

E-commerce industrial chain synergy refers to a process where platform enterprises, manufacturers, service providers (e.g., logistics, payment, marketing), and consumers maximize collective value through information sharing, resource integration, and process alignment based on common objectives. It essentially constitutes a networked value co-creation system underpinned by data interconnection^[7].

The theoretical evolution of this synergy exhibits two salient features:

Organizational Networking. The conventional linear chain is evolving into a "networked industrial chain," where modular division of labor shifts enterprise relations from "upstream-downstream control" to "multilateral value creation." A representative example is SHEIN, which leverages a digital platform to interconnect over 5,300 suppliers globally, forming an agile network conducive to small-batch production and rapid response.

Data as the Collaborative Core. The market-oriented circulation of data elements redefines collaborative logic, elevating the chain from "product integration" to a dual-driven framework of "knowledge integration + value integration." Through data mid-platforms, platform enterprises enable cross-organizational knowledge sharing (e.g., in demand forecasting and inventory scheduling), substantially enhancing synergistic efficiency.

3.2 Driving Mechanism: The Coupling Effect of Four-Dimensional Motivations

The deepening of e-commerce industrial chain synergy is propelled by four interconnected motivations, constituting a closed-loop system encompassing "demand, efficiency, risk, and innovation." The deepening of e-commerce industrial chain synergy is driven by four dimensions: demand, efficiency, risk, and innovation, and the mechanism of action of each dimension and corresponding empirical evidence can be clearly shown in Table 2.

Table 2: A Four-Dimensional Framework of Driving Mechanisms for Industrial Chain Synergy

Driving Dimension	Mechanism Description	Empirical Evidence / Manifestation
Demand Pull	Consumer demand for personalization and real-time fulfillment drives the industrial chain toward rapid response capabilities.	2025 Global Consumer Survey: 75% of cross-border shopping decisions are influenced by delivery timeliness.
Efficiency Gain	Data sharing mitigates the bullwhip effect; AI-powered intelligent replenishment reduces inventory mismatches.	Implementation of an IoT platform by a Carolina-based network achieves 99.9% inventory accuracy through full-link visualization.
Risk Resilience	Enhanced supply chain flexibility to mitigate disruptions (e.g., pandemics, geopolitical conflicts).	2025 Cross-border E-commerce Report: 50.8% of merchants adopt "localized stocking" strategies to hedge against customs clearance risks.
Innovation Catalyst	Support for emerging models (e.g., live-streaming e-commerce) and facilitation of collaborative R&D.	SHEIN's development of 170 production tools (e.g., automated bead embroidery machines) has improved supplier efficiency by 30%.

3.3 Competency Reconstruction: Aligning Collaborative Dimensions with Professional Competencies

Guided by the Level-II criteria of the National Vocational Skills Standard for E-commerce Engineers (2021 Edition), industrial chain synergy necessitates alignment across three competency dimensions. These dimensions collectively form a triangular framework that integrates "talent capability (analysis/collaboration)," "organizational mechanism (rules/processes)," and "data-driven approaches (insight/decision-making)," systematically sustaining the enhancement of synergistic efficiency throughout the e-commerce chain. The three collaborative dimensions of vertical, horizontal, and end-to-end synergy correspond to different core professional competency requirements for Level-II e-commerce engineers, and the specific mapping relationship between them is shown in Table 3.

Table 3: Mapping of Industrial Chain Collaborative Dimensions and Professional Competencies

Collaborative Dimension	Connotation	Corresponding Level II E-commerce Engineer Competencies
Vertical synergy	Integrates production with consumption to establish a demand-driven, closed-loop value chain from R&D to delivery.	Core Competencies: Market research & data analysis (e.g., user behavior analysis, demand forecasting); commodity planning & management (e.g., category lifecycle management, data-driven inventory guidance). Professional Requirements: Proficiency in category planning tools and user demand conversion path design.
Horizontal synergy	Fosters cooperation among internal and external platform service providers (e.g., logistics, marketing, payment) to build an open, integrated service ecosystem.	Core Competencies: Platform operation management (rule design); electronic payment & settlement management (capital flow optimization). Professional Requirements: Skills in developing open API systems (e.g., Tmall's "Business Staff" tool), cross-provider API collaboration, and ensuring platform governance compliance.
End-to-end synergy	Optimizes user experience and operational efficiency across the entire chain, from procurement to after-sales.	Core Competencies: Supply chain management (inventory response); e-commerce project management (process collaboration). Professional Requirements: Mastery of the SCOR model, demand forecasting tools, risk mitigation plans, and privacy-computing technologies (e.g., federated learning) for secure data sharing.

Key findings reveal two critical aspects of competency development in e-commerce. First, data-driven collaboration constitutes a systematic requirement that extends beyond inter-organizational coordination to encompass comprehensive capabilities for e-commerce professionals. Practitioners must develop π -shaped competencies that integrate digital skills such as Python and SQL for data analysis, domain knowledge including category and supply chain management, and collaborative literacy for cross-organizational communication and conflict resolution. These integrated capabilities are essential for driving holistic value transformation from initial demand insight to final operational rule design.

Second, professional competency standards are undergoing a fundamental shift from an emphasis on singular skills toward a π -shaped structure that combines digital proficiency, industrial depth, and synergistic resilience. Specifically, Level-II e-commerce engineers are expected to master data analysis tools and supply chain collaboration systems to enable data-informed business decisions. They must also develop specialized expertise in vertical domains such as commodity management and inventory response to form scenario-based solution capabilities. Furthermore, they require soft skills including cross-service provider negotiation, multi-stakeholder consensus building, and complex project conflict resolution to effectively support open ecological collaboration.

4. Mechanism Analysis of Industrial Chain Synergy Driven by Market-Oriented Data Element Allocation

This paper constructs a "five-dimensional driving mechanism model" to systematically explain how data elements promote industrial chain synergy through market allocation (see Figure 1).

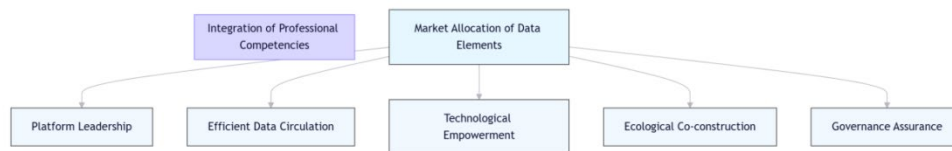


Figure 1: A Five-Dimensional Mechanism Model for E-commerce Industrial Chain Synergy Driven by Market-Oriented Data Element Allocation

With "market-oriented data element allocation" as the core driver, this model facilitates deep synergy—vertical, horizontal, and end-to-end—within the e-commerce industrial chain through five interconnected mechanisms: "platform enterprise leadership," "efficient data element circulation," "digital technology empowerment," "collaborative ecological co-construction," and "governance guarantee." Furthermore, core competencies from the National Vocational Skills Standard for E-commerce Engineers (Level-II) are embedded at the model's foundation, underscoring the critical supporting role of talent capabilities in the collaborative process.

Each dimension in this five-dimensional driving mechanism model undertakes different functional roles and is a key support for realizing e-commerce industrial chain synergy, with the specific functional explanation of each dimension shown in Table 4.

Table 4 Functional Explanation of the Five-Dimensional Mechanism

Dimension	Function Description
Platform Enterprise Leadership	Orchestrates ecological synergy by constructing data mid-platforms, providing open empowerment, and establishing rules, serving as the hub for data aggregation and distribution.
Efficient Data Element Circulation	Facilitates "available but invisible" and "credible and traceable" cross-entity data flow through property rights confirmation, market transactions, and privacy-enhancing technologies.
Digital Technology Empowerment	Enhances collaborative intelligence, automation, and visualization by leveraging AI, cloud computing, IoT, and blockchain.
Collaborative Ecological Co-construction	Fosters a mutually beneficial industrial community by promoting joint value creation, resource sharing, and risk mitigation among participants.
Governance Guarantee	Ensures fairness, security, and sustainability by establishing institutional rules, safety compliance systems, and trust mechanisms.
Professional Competency Integration	Strengthens talent support by embedding Level-II competencies (e.g., data analysis, supply chain management) into each collaborative dimension.

4.1 Platform Enterprise Leadership: Building a Collaborative Ecological Center

Platform enterprises, as core organizers of the e-commerce ecosystem, have evolved from transactional matchmakers into "ecological orchestrators," pivotal in aggregating, governing, and redistributing data value. Their leadership, exercised through central platform structures that integrate fragmented resources, manifests in four key mechanisms.

First, the integrated data mid-platform creates unified capabilities for data collection, governance, analysis, and service. Alibaba's Data Mid-Platform, for example, standardizes global data (goods, users, transactions, logistics)^[8], directly supporting the "data analysis and application capabilities" mandated by the E-commerce Engineer Standard.

Second, the open empowerment model provides partners with data insights and tools via APIs and standardized products (e.g., Tmall's "Business Staff"), lowering the application threshold and enabling precise operations.

Third, rule-based governance coordinates multi-party interests through data sharing protocols, security norms, and incentive mechanisms, as seen in Pinduoduo's "Farmland Cloud Group Buying" model, ensuring secure and orderly data flow.

Finally, these mechanisms collectively generate an ecological gravitational effect, attracting high-quality resources through demonstrated data value. This concentration and complementarity significantly boost the ecosystem's overall competitiveness and innovation capacity.

4.2 Efficient Data Element Circulation: Unblocking Collaborative Pathways

Efficient market-oriented circulation of data elements is a prerequisite for breaking information barriers and achieving deep industrial chain synergy. This process requires a comprehensive system spanning the entire data lifecycle, beginning with rights confirmation and registration. Clarifying data sources, processors, and ownership—as in the "tripartite rights separation" model—establishes a legal foundation for transactions, exemplified by the asset registration practices of the Beijing International Big Data Exchange.

Following rights confirmation, market-based transaction and allocation mechanisms take effect. Specialized data exchanges (e.g., Hangzhou Data Exchange) enable compliant, standardized circulation and pricing of data products, directing flows to high-value applications like consumer trend analysis and optimizing resource allocation. The security of these transactions is underpinned by trusted sharing technologies. Privacy-computing techniques (e.g., federated learning) and blockchain facilitate "usable but invisible" data sharing, resolving the tension between circulation and security^[9], as demonstrated in JD.com and Walmart's joint user-profile modeling.

Collectively, these interconnected mechanisms—rights confirmation, market transactions, and trusted technology—dismantle information asymmetry across the chain. They ensure timely and credible data access, providing critical support for collaborative forecasting, replenishment, and risk early-warning.

4.3 Digital Technology Empowerment: Enhancing Collaborative Intelligence

Digital technology integration profoundly underpins the efficient allocation of data elements, catalyzing a transformation in industrial chain collaboration toward greater intelligence, automation, and transparency. This technological empowerment manifests through several interconnected mechanisms.

AI-driven intelligent decision-making constitutes a primary catalyst, where machine learning algorithms analyze vast datasets to enable precise demand forecasting, inventory optimization, and personalized recommendations. Systems like Meituan's intelligent product selection exemplify this capability, automating complex decisions to significantly enhance operational speed and accuracy^[10].

The infrastructure enabling such applications is predominantly supplied by cloud computing. Cloud platforms provide the flexible, scalable, and cost-effective computational resources that underpin collaborative systems. Alibaba Cloud's Collaborative Supply Chain Cloud Platform, for instance, has dramatically reduced the barriers for SME participation in digital collaboration.

Further enriching this digital fabric, IoT connectivity bridges the physical and digital divide by capturing real-time data on asset location, status, and operational parameters. Cainiao's intelligent warehousing system demonstrates how IoT-derived data enables full supply chain visibility and provides critical, real-time inputs for decision-making processes.

Ultimately, these technologies converge into a synergistic cluster, wherein AI, cloud computing, IoT, and blockchain mutually reinforce one another. This convergence drives deeper value extraction from data and propels the intelligent evolution of collaborative business models beyond the sum of their individual parts.

4.4 Collaborative Ecological Co-construction: From Single-Point Cooperation to Network Synergy

Market-oriented data allocation catalyzes the transition from discrete transactional relationships to a deeply integrated, networked ecosystem. This evolution is propelled by mechanisms rooted in data-mediated trust and shared value creation.

A fundamental shift is evident in data-driven value co-creation, where partners leverage shared insights to identify market needs and innovate collaboratively. The partnership between Haier Smart Home and JD.com, yielding highly successful "smart home appliances" based on user behavior data, exemplifies this paradigm. It demonstrates data's capacity to dissolve organizational boundaries, forging a continuous innovation loop from demand sensing to supply response.

Parallel to co-creation, platform-enabled resource sharing optimizes ecosystem-wide asset utilization. Through data analytics and intelligent scheduling, platforms can activate idle resources—from production capacity to logistics—reducing mismatch and elevating efficiency. Cargo Lala's use of data forecasting illustrates this mechanism's potential to enhance overall resource productivity.

Moreover, data transparency fosters novel risk-sharing frameworks that deepen trust. Supply chain finance models, leveraging transaction data from e-commerce platforms, enable accurate credit assessment for SMEs. MYbank's platform, providing unsecured loans to over 100,000 suppliers, underscores how this approach mitigates operational risks and bolsters the network's collective resilience.

The interplay of co-creation, resource sharing, and risk mitigation cultivates a tightly-knit industrial community. This synergy generates a pronounced "1+1>2" effect, substantially amplifying the ecosystem's overall competitiveness.

4.5 Governance Guarantee: Ensuring the Fairness, Safety, and Sustainability of Synergy

A robust governance framework is indispensable for balancing efficiency with security, and innovation with compliance, within the data-driven synergistic ecosystem. This framework comprises several mutually reinforcing components.

The establishment of clear rules and standards provides the essential institutional groundwork. Initiatives like the E-commerce Data Security Guide that promote unified protocols for data ownership, transactions, and security create a common language and predictable environment for collaboration.

Operationalizing these rules requires a comprehensive safety and compliance assurance system. This integrates technological safeguards—encryption, access controls—with management practices like audits and certifications. Vipshop's multi-level protection system exemplifies this holistic approach, ensuring data security throughout its lifecycle and aligning with e-commerce engineers' competency requirements.

Adding a critical layer of trust, trusted traceability mechanisms utilize technologies like blockchain to ensure the integrity of data and product flows. Ant Chain's traceability platform, securing the journey of 500,000 cross-border products, demonstrates how this technology builds confidence among ecosystem participants, enabling complex collaborations.

Together, these governance elements form the vital institutional infrastructure for the ecosystem. They effectively lower transaction costs and cooperative risks, thereby ensuring the fairness, security, and long-term sustainability of market-led industrial chain synergy.

5. Policy Implications and Recommendations

To fully leverage the synergistic potential of market-oriented data element allocation within the e-commerce industrial chain, this study proposes the following systematic countermeasures, addressing current challenges in institutional systems, technical support, governance, and talent development.

5.1 Strengthening the Data Infrastructure and Institutional Framework

A robust institutional framework is fundamental for facilitating data circulation. This entails, first, clarifying data property rights. Building on local pilot regulations (e.g., Shenzhen SEZ Data Regulations), national-level legislation should be accelerated to define the boundaries and circulation rules for data resource holding, processing, and operational rights, establishing a solid legal foundation for market-based data exchange.

Second, standardizing the data trading market is essential. This requires refining the operational mechanisms of data exchanges and establishing comprehensive rules covering asset valuation, pricing, transaction matching, and dispute resolution. Initiatives like the Shanghai Data Exchange's "Data Product Description" system can enhance transaction transparency, efficiency, and compliance.

Finally, promoting technical standardization is necessary. Collaborative efforts are needed to formulate and implement key standards for data elements, interface protocols, security, and quality assessment. Guidelines such as the E-commerce Data Asset Management Guide can eliminate interoperability barriers and improve data quality reliability.

5.2 Activating Platform Enterprises as Ecological Orchestrators

The central role of platform enterprises as ecological organizers must be reinforced. Key measures include deepening open empowerment. Policy guidance (e.g., Zhejiang's "Healthy Platform Economy" pilot) should encourage leading platforms to compliantly share core data resources and technical

capabilities, thereby enhancing partners' data application proficiency and collaborative efficiency.

Furthermore, strengthening platform governance responsibilities is vital. Guided by frameworks like the E-commerce Platform Management Responsibility Guidelines, platforms should establish fair, transparent, and secure ecological rules to balance multi-stakeholder interests and mitigate collaborative risks.

Supporting platform data capability-building is equally critical. Platforms should be incentivized to invest in data mid-platforms, enhancing competencies in data aggregation, intelligent analysis, value mining, and service output to provide robust infrastructure for industrial chain synergy.

5.3 Consolidating the Technical Foundation for Data Circulation

A reliable technical support system is crucial. Priority should be placed on overcoming barriers in privacy-enhancing technologies (PETs), such as federated learning and secure multi-party computation. Increased R&D investment, potentially channeled through national initiatives like the "New Generation AI" project, can promote their large-scale, secure application in e-commerce data sharing and joint modeling.

Concurrently, leveraging blockchain for trust enhancement is recommended. Promoting its application in data registration, transaction notarization, and traceability tracking, aligned with policies like the People's Bank of China's FinTech Development Plan, can foster a "credible, traceable, and tamper-proof" data circulation environment.

Upgrading information infrastructure remains a priority. Continuous advancement in 5G, IoT, cloud computing, and edge computing, as outlined in the NDRC's "New Infrastructure Construction Action Plan," is necessary to meet the computational and network demands for real-time data processing and collaboration.

5.4 Establishing a Collaborative Multi-Stakeholder Governance System

An effective governance model is imperative. Exploring a "quadruple helix" governance framework involving government regulation, platform accountability, industry self-discipline, and social supervision (inspired by the EU Digital Markets Act) can clarify responsibilities and foster collaborative oversight.

Strengthening safety compliance and enforcement is paramount. Strict adherence to the Cybersecurity Law, Data Security Law, and Personal Information Protection Law is essential to bolster regulatory efficiency and corporate compliance, thereby solidifying the data security baseline^[11].

Implementing a data market credit mechanism is also key. Establishing a credit evaluation and publicity system for data suppliers, users, and intermediaries can mitigate transaction risks and enhance market efficiency through credit constraints.

Finally, cultivating interdisciplinary talent is foundational. Systematically integrating core competencies from the National Vocational Skills Standard for E-commerce Engineers (Level-II)—such as data analysis, supply chain collaboration, and data security—into corporate training and vocational education is vital for enhancing data literacy and collaborative capabilities, providing a sustainable talent guarantee for deep industrial chain synergy.

6. Conclusion

The efficient market allocation of data elements is essential for enhancing e-commerce industrial chain synergy and boosting digital economy productivity. This study proposes a five-dimensional mechanism—platform leadership, factor circulation, technology empowerment, ecological co-construction, and governance guarantee—to illustrate how data elements reshape industrial chain operations through institutional and technological innovation. Theoretically, this research integrates resource allocation and value co-creation theories into a unified framework and incorporates Level-II e-commerce vocational competencies, bridging theory and practice. Practically, it underscores the need to balance data openness and security, guide platforms from traffic-driven operations to value creation, and enhance SMEs' data application capabilities.

In conclusion, advancing data-driven industrial chain integration requires systematic efforts in technology, institutions, ecology, and talent. Promoting innovation, strengthening institutional

foundations, and fostering open cooperation will build a resilient e-commerce ecosystem and support high-quality digital economic development.

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