

Research Review on the Breakthrough Path of Traditional SMEs' E-commerce Under the Background of Digital Transformation

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Abstract: The in-depth integration of digital economy and real economy has restructured the competition paradigm and growth logic of the e-commerce industry, driving the industry from extensive traffic expansion to a stock competition stage featuring quality improvement and efficiency enhancement. Against the backdrop of industrial iteration and upgrading, the solidified development model of traditional small and medium-sized enterprises (SMEs) relying on offline physical operation, traditional foreign trade order receiving and extensive online bulk sales can no longer adapt to the high-quality development requirements of e-commerce. Practical dilemmas including single channel structure, severe product homogenization, weak digital operation capability and prominent resource constraints continuously restrict the transformation, upgrading and long-term development of small and medium-sized e-commerce entities. With the continuous iteration of digital technologies, the implementation of industrial support policies and the in-depth upgrading of resident consumption scenarios, digital transformation has become the core approach for traditional SMEs to break through operational bottlenecks and achieve industrial breakthroughs. Adopting the research methods of literature review, comparative analysis and inductive summary, this paper systematically sorts out domestic and foreign research achievements on the digital transformation of SMEs' e-commerce, clarifies the development status, transformation shackles and underlying evolution logic of traditional small and medium-sized e-commerce businesses, and conducts a panoramic review from six dimensions: industrial development trend, core transformation bottlenecks, transformation driving mechanism, operation model comparison, differentiated breakthrough paths and future development trends. By constructing two comparative analysis systems (traditional extensive e-commerce vs. digital refined e-commerce, large enterprises vs. SMEs) and combining macro industrial statistical data and industrial development characteristics, this paper intuitively reveals the differentiated endowments and existing shortcomings of SMEs' digital transformation. The research shows that the full-link and heavy-investment digital reconstruction model adopted by large enterprises is not suitable for the resource-constrained characteristics of traditional SMEs, and the incremental upgrading featuring lightweight, precision and scenario-based development is the core path adapted to the operational status of SMEs. Platform ecological empowerment, lightweight digital tool implementation, refined private domain operation, digital adaptation of supply chain and policy-ecology coordination are the key paths for small and medium-sized e-commerce businesses to break through industrial development dilemmas. On the basis of sorting out existing research and analyzing research deficiencies, this paper clarifies the future academic research directions and industrial evolution trends. The research conclusions can provide theoretical reference and practical support for the transformation practice of traditional SMEs' e-commerce, the deepening of relevant academic research and the optimization of industrial policies, and help small and medium-sized e-commerce entities achieve high-quality and long-term development.

Keywords: digital transformation; traditional small and medium-sized enterprises; e-commerce; breakthrough path; private domain operation; industrial upgrading; research review

1. Introduction

The digital economy serves as the core driving force for the transformation and upgrading of China's real economy and the cultivation of new productive forces. As the most widely penetrated and deeply implemented core format of the digital economy, e-commerce has completely subverted the transaction mode and competition rules of traditional commerce. According to data from the National Bureau of Statistics of China, the scale of China's online retail market continues to expand, yet the industry has completely bid farewell to the incremental barbaric growth stage and entered a

mature development cycle of stock competition and quality improvement. Fading traffic dividends, personalized and scenario-based upgrading of resident consumption, and intensified industrial competition have become the core characteristics of the current e-commerce industry. Compared with large brand enterprises that possess sufficient capital reserves, mature technical systems, complete talent echelons and controllable supply chain systems, traditional SMEs generally suffer from inherent shortcomings including lagging digital thinking, insufficient technical implementation capacity, extensive operation modes, weak brand influence and poor risk resistance. These shortcomings cause most small and medium-sized merchants to fall into a passive state of stagnant growth, shrinking profits and customer churn in stock competition, and the drawbacks of the extensive development of traditional e-commerce have become increasingly prominent.

In recent years, national and local governments have continuously issued a series of supportive policies for the digital empowerment of SMEs and the high-quality development of e-commerce, constantly improving the supporting service system and business environment for e-commerce, and laying a solid policy foundation for the digital transformation of traditional SMEs' e-commerce. Meanwhile, the lightweight popularization of cloud computing, big data, artificial intelligence, AIGC and other digital tools has greatly reduced the technical threshold of digital transformation and broken the long-term monopoly of large enterprises on core digital technologies. For SMEs with limited resources and weak risk resistance, the inclusive development of digital technologies has realized the upgrading of low-cost, high-efficiency and low-threshold e-commerce models, creating favorable industrial and market conditions for small and medium-sized merchants to break through resource shortcomings and achieve industrial iteration and upgrading.

In terms of existing academic research, current studies on e-commerce digital transformation mainly focus on head e-commerce platforms, large brand enterprises and the overall cross-border e-commerce industry, while systematic and specialized research on the e-commerce transformation of traditional small and medium-sized physical enterprises is scattered. Most existing literatures carry out fragmented analysis on single dilemmas and individual countermeasures, lacking holistic framework sorting, differentiated comparison and path integration, and fail to form a dedicated breakthrough theoretical system adapted to the resource characteristics of Chinese SMEs and local e-commerce ecology. Based on the above background, this paper conducts a panoramic review from six dimensions including development status, transformation bottlenecks, driving mechanisms, model comparison, breakthrough paths and development trends by integrating domestic and foreign relevant literatures and front-line industrial practical experience. It clarifies the transformation pain points and breakthrough logic of small and medium-sized merchants through quantitative comparison of transformation differences among different operation models and enterprise scales. This research effectively makes up for the defects of fragmentation and insufficient pertinence in existing studies, enriches the theoretical system of SMEs' digital transformation, and provides implementable reference schemes for the transformation practice of small and medium-sized e-commerce practitioners, possessing important theoretical value and practical guiding significance^[1].

2. Review of Domestic and Foreign Research Status

2.1 Foreign Research Status

The e-commerce industry started earlier in foreign countries with a more mature market-oriented development system, forming a more complete and diversified research system for the digital transformation of SMEs' e-commerce. Existing foreign studies mainly conduct in-depth exploration on core directions such as digital technology empowerment, platform ecology construction, data refined operation and cross-border business adaptation. Based on basic economic theories including transaction cost theory and network economy theory, early foreign scholars confirmed through empirical research that e-commerce can help SMEs break geographical operation restrictions, reduce transaction costs and expand market radiation boundaries, verifying that digital upgrading is a key path for SMEs to make up for scale disadvantages and enhance core market competitiveness.

In terms of technology application, foreign academic circles focus on exploring the application value of cutting-edge digital technologies such as big data and artificial intelligence in user portrait construction, precision marketing, supply chain integration and optimization, and operational risk management, verifying the positive role of digital technologies in solving SMEs' pain points including subjective operational decision-making, inefficient resource allocation and ambiguous market positioning. Based on panel data of the global e-commerce industry, some scholars empirically tested the positive correlation between digital investment and the operational performance of SMEs' e-commerce, and proposed that the application of lightweight digital tools and in-depth embedding of platform ecology are the optimal transformation models adapted to the sustainable development of small and medium-sized merchants.

At the industrial ecology level, foreign studies focus on platform empowerment mechanisms and multi-dimensional policy coordination systems. It is believed that the industrial empowerment ecology built by large e-commerce platforms and professional digital service providers can effectively make up for SMEs' shortcomings in technology, talents, capital and other dimensions, and significantly reduce the trial cost and market access threshold of digital transformation. Meanwhile, foreign scholars have carried out subdivided research on the differentiated dilemmas of SMEs' digital transformation, pointing out that small and medium-sized merchants generally suffer from digital resource mismatch, insufficient endogenous transformation motivation and poor technology scenario adaptation. They emphasized that the multi-collaborative governance model combining government policy support, industrial association guidance and social service matching plays an important supporting role in SMEs' digital transformation^[2].

On the whole, foreign relevant studies have formed a complete and logically comprehensive theoretical system. However, their research scenarios adapt to the mature e-commerce market and SME development ecology in Europe and America, and the research logic leans towards pure market-oriented and technology-driven development. There are significant differences with China's characteristic formats such as private domain e-commerce and social e-commerce, as well as the local national conditions of SMEs' limited resources and fierce market competition. Thus, foreign research conclusions cannot be directly applied to the transformation practice of domestic small and medium-sized e-commerce businesses.

2.2 Domestic Research Status

Domestic research on the digital transformation of SMEs' e-commerce has been gradually enriched with the iterative development of China's digital economy. Existing achievements can be roughly divided into three categories: transformation dilemmas, transformation driving mechanisms, and transformation path countermeasures. In terms of transformation dilemmas, most scholars have found through field research and empirical analysis that the transformation dilemmas of traditional SMEs' e-commerce are concentrated in three dimensions: cognition, resources and operation. Subjectively, enterprise managers have shallow digital cognition, insufficient transformation initiative and lack of long-term digital strategic layout. Objectively, they generally face hard shortcomings such as capital shortage, lack of professional talents, weak technical implementation capacity and low adaptation between supply chain and online business formats. In terms of operation, they are trapped in homogeneous competition for a long time, overly rely on platform public domain traffic, lack refined operation, and have insufficient core brand competitiveness.

In terms of transformation driving mechanisms, existing studies have generally confirmed that policy support, technological iteration, consumption upgrading, market competition pressure and enterprise cost reduction and efficiency improvement demands are the five core factors driving the digital transformation of SMEs' e-commerce. The implementation of digital economy special policies provides institutional guarantee and resource support for SMEs' transformation. The popularization of lightweight digital tools greatly reduces the transformation access threshold. The personalized and scenario-based upgrading of consumption demands forces enterprises to innovate extensive operation modes. The fierce competition in the stock market promotes enterprises to abandon extensive development paths and pursue transformation and upgrading.

In terms of transformation paths and countermeasures, domestic scholars have summarized diversified optimization paths combined with the transformation practice of SMEs in different regions and industries, mainly including platform settlement empowerment, long-term private domain traffic operation, short video and live broadcast business transformation, digital upgrading of supply chain, differentiated brand construction and the implementation of lightweight digital tools. Some studies have verified the positive empowering effect of refined operation, scenario-based marketing and digital supply chain transformation on the breakthrough and quality improvement of small and medium-sized e-commerce businesses through typical enterprise case demonstration.

Domestic relevant research achievements are abundant in quantity but still have obvious shortcomings. First, the research perspectives are scattered, mostly focusing on single-point problem analysis, lacking holistic and systematic theoretical framework sorting and system construction. Second, differentiated comparative research is scarce, with few quantitative comparisons of transformation differences among different operation models and enterprise scales, and the exclusive transformation logic adapted to SMEs remains unclear. Third, some studies mechanically copy the heavy-asset transformation model of large enterprises, which is divorced from the low-cost, lightweight and low-fault-tolerance development needs of SMEs, resulting in insufficient practicality. Fourth, integrated research and judgment on the future development trends of small and medium-sized e-commerce businesses under the background of new technologies, new scenarios and new supervision is weak^[3].

2.3 Review of Existing Research and Marginal Contributions of This Paper

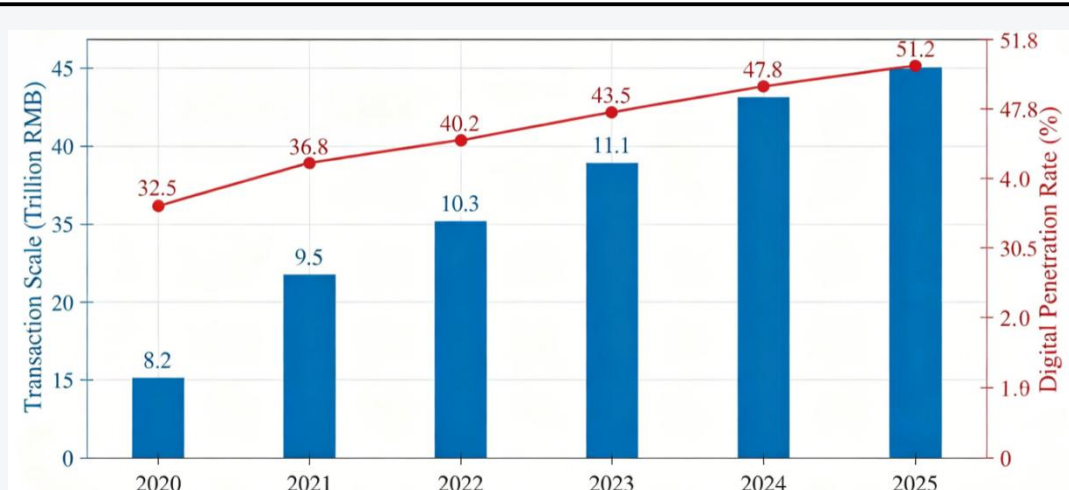
A review of domestic and foreign existing studies shows that academic circles have generally recognized the positive empowering value of digital transformation for the high-quality development of SMEs' e-commerce, and basically clarified the core pain points and basic optimization paths of SMEs' transformation. However, on the whole, there is still a lack of a systematic breakthrough framework adapted to China's local industrial ecology and SMEs' resource constraints, as well as a panoramic review research with quantitative comparison and complete logic. Based on the above research gaps, the marginal contributions of this paper are reflected in three aspects: first, constructing a complete six-dimensional integrated research framework integrating status, bottlenecks, driving factors, comparison, paths and trends, making up for the fragmentation and unsystematic defects of existing studies; second, building two quantitative comparison systems to intuitively distinguish the transformation differences between traditional and digital e-commerce, large enterprises and SMEs, and clarify the exclusive lightweight transformation logic of small and medium-sized e-commerce businesses; third, constructing low-cost, high-adaptability and implementable differentiated breakthrough paths combined with industrial development maps and front-line practical scenarios, abandoning the heavy-asset transformation ideas divorced from SMEs' reality, and effectively improving the academic rigor and practical guidance of the research, which conforms to the specifications of CSSCI journal review papers^[4].

3. Development Status and Core Transformation Bottlenecks of Traditional SMEs' E-commerce

3.1 Overall Industrial Development Status

With the comprehensive penetration of digital technologies into the commercial circulation field, the vast majority of domestic traditional SMEs have completed basic online access, and gradually shifted from single offline operation and traditional foreign trade order receiving to an integrated online-offline compound operation model. At present, the small and medium-sized e-commerce industry presents a structural feature of "steady total growth and weak operating benefits". On the one hand, the overall transaction scale of the industry continues to expand, but in the stock competition, platform traffic costs rise year by year, and low-price homogeneous competition continuously squeezes the industrial profit space, leaving a large number of SMEs trapped in the operating dilemma of "sales volume growth without profit growth". On the other hand, the overall transformation willingness of the industry has increased significantly, but the transformation quality is uneven. A small number of leading small and medium-sized merchants have initially realized refined digital operation, while most small and medium-sized businesses remain in the primary e-commerce stage of online store opening and passive order receiving. Their digital transformation is superficial and fails to bring in-depth changes to core operational links such as operation, marketing and supply chain.

Figure 1 Transaction Scale and Digital Penetration Trend of SMEs' E-commerce Industry in China (2020–2025)



Note: The bar chart represents the overall transaction scale of China's SMEs e-commerce; the line chart represents the industry digital penetration rate (%). 2025 data is a predicted value based on industrial growth trends.

From the perspective of macro industrial data, the transaction scale of Chinese SMEs' e-commerce has maintained steady growth from 2020 to 2025, serving as the core subject supporting the increment of China's e-commerce industry. However, the industrial growth rate has slowed down year by year, entering a mature development stage of stock quality

improvement. Meanwhile, although the digital penetration rate of SMEs' e-commerce has continued to rise slightly, its growth rate is far lower than that of large enterprises. Moreover, existing digital applications are mostly concentrated in basic links such as store opening and online order receiving, while high-level digital applications including marketing promotion, user operation, supply chain management and data analysis have extremely low popularity. This feature intuitively verifies the industrial status of small and medium-sized e-commerce businesses featuring "peaked scale, superficial transformation and difficult efficiency improvement", and indicates that in-depth digital empowerment is the core key to breaking through industrial development bottlenecks and realizing quality and efficiency improvement.

In terms of specific operation models, traditional SMEs' e-commerce has prominent development shortcomings. Most merchants are highly dependent on mainstream public domain e-commerce platforms, with traffic acquisition completely restricted by platform rules and algorithm mechanisms, resulting in common problems such as high customer acquisition costs, weak user stickiness and low repurchase conversion rate, and no independently controllable private domain traffic assets have been built. In terms of marketing, they mainly rely on low-price promotion and full reduction concessions for drainage, lacking scenario-based, content-based and personalized marketing capabilities, resulting in extremely low product and store brand recognition and difficulty in forming differentiated competitive advantages. In terms of supply chain, they adopt traditional operation models adapted to offline physical stores, with low digitalization and intelligence in production, procurement, inventory and logistics links, failing to efficiently match the fragmented, real-time and personalized online consumption demands of e-commerce, and the long-standing problem of supply-demand mismatch is difficult to solve fundamentally^[5].

3.2 Core Breakthrough Bottlenecks of Traditional SMEs' E-commerce

Combined with existing literature research and industrial field survey data, this paper summarizes the core bottlenecks of traditional SMEs' e-commerce digital transformation into six dimensions: cognition, resources, operation, supply chain, compliance and talents, and systematically sorts out the development shackles and transformation obstacles commonly faced by small and medium-sized e-commerce businesses.

First, cognitive bottleneck: lagging digital thinking and deviated transformation positioning. Most SME managers adhere to traditional commercial thinking, simply equating e-commerce transformation with online store opening and online sales, ignoring the core value of digital operation, user asset precipitation and long-term brand building. There are two common cognitive misunderstandings in the industry: some merchants fear transformation risks, stick to traditional operation modes, and lack forward-looking initiative for innovation and upgrading; others blindly benchmark large enterprises and invest heavily in building full-link digital systems, ultimately leading to transformation failure due to insufficient resources and poor model adaptability, further increasing enterprise operating burdens. On the whole, most SMEs lack lightweight transformation ideas and long-term strategic planning adapted to their own operation scale and resource conditions.

Second, resource bottleneck: limited capital endowment and insufficient digital transformation investment. Compared with large enterprises with sufficient capital reserves and diversified financing channels, SMEs have small capital volume, weak risk resistance and narrow financing channels. Long-term continuous capital investment is required for digital system iteration, brand building, professional talent introduction and technical upgrading, but SME profits are mostly used for daily operation turnover, making it difficult to bear large-scale digital transformation costs. Meanwhile, digital transformation involves certain trial costs, and the extremely low fault tolerance rate of SMEs significantly restricts their initiative in transformation and innovation.

Third, operational bottleneck: extensive and solidified operation modes and prominent low-price homogeneous competition. At present, most small and medium-sized e-commerce businesses have single and solidified operation modes, relying on the core logic of "paid traffic purchase and low-price volume sales", highly dependent on platform public domain traffic, and lacking core capabilities of independent customer acquisition, precise operation and long-term user retention. In terms of products, they blindly follow market popular styles with serious homogenization and no core differentiated advantages; in terms of marketing, the forms are single and scenarios are solidified, failing to adapt to new e-commerce scenarios such as live broadcast, short video and social private domain; in terms of users, they lack refined hierarchical management and personalized service awareness, with a high proportion of one-time transactions, high user churn rate and weak repurchase capacity. The extensive and solidified operation mode traps SMEs in low-price involution and continuously compresses profit space.

Fourth, supply chain bottleneck: low digital adaptation and serious lag in supply-demand response. The supply chain system of traditional SMEs mainly serves offline batch physical operation, with insufficient digitalization and

intelligence in all links, unable to efficiently link with the fragmented, real-time and personalized operational demands of online e-commerce. Online consumption demands are characterized by small batch, diversification and high timeliness, while traditional supply chains focus on batch production and inventory volume sales, with slow market response speed and insufficient flexible production capacity, prone to problems such as inventory backlog, stock shortage and logistics lag, which directly affect consumer shopping experience and store reputation. In addition, SMEs lack the capital and technical capacity for supply chain digital transformation, failing to dynamically adjust production and stocking plans based on market data, making the core problem of supply-demand mismatch difficult to eradicate.

Fifth, compliance bottleneck: imperfect compliance system and prominent digital operational risks. In recent years, the supervision system of the e-commerce industry has been continuously tightened, with increasingly refined supervision standards for intellectual property protection, user data privacy security, advertising promotion norms and after-sales rights protection mechanisms. However, most SMEs have weak compliance awareness, and frequently encounter problems such as material infringement, false promotion and non-standard user data storage in daily operation, which easily trigger platform penalties, consumption disputes and legal risks. Meanwhile, most enterprises have not built basic data security protection systems, with non-standard collection, storage and use of user information, resulting in potential data leakage risks and hidden dangers for long-term enterprise operation^[6].

Sixth, talent bottleneck: scarcity of professional talents and insufficient digital transformation capacity. The refined digital operation of e-commerce requires compound talents with comprehensive capabilities in e-commerce operation, digital technology, content marketing, supply chain management and compliance risk control. However, restricted by salary levels, development platforms, geographical conditions and enterprise scale, SMEs struggle to attract and retain professional digital talents. Existing enterprise operators are mostly transformed from traditional commercial practitioners, lacking professional capabilities in data analysis, refined operation and new scenario business operation. The talent shortage has become the core soft obstacle restricting the quality upgrading of small and medium-sized e-commerce businesses.

4. Comparative Analysis of E-commerce Operation Modes and Enterprise Transformation Capabilities

To accurately locate the transformation shortcomings of SMEs' e-commerce and clarify the breakthrough direction adapted to their development, this paper constructs two core comparative analysis systems: the operation mode comparison between traditional extensive e-commerce and digital refined e-commerce, and the digital transformation capability comparison between large and medium-sized enterprises and SMEs. Quantitative comparison is adopted to intuitively present the transformation differences of different operation modes and market subjects, define the transformation boundaries and core logic of SMEs, and provide solid data support and theoretical basis for the subsequent path construction.

4.1 Operation Mode Comparison Between Traditional E-commerce and Digital Refined E-commerce

This paper conducts an all-round quantitative comparison of the two e-commerce operation modes from eight core dimensions: traffic acquisition, core operation logic, cost structure, user management system, product iteration mechanism, supply chain response capacity, profit model and risk resistance capacity, intuitively showing the empowering advantages of digital refined operation and the inherent defects of traditional e-commerce mode, as shown in Table 1.

Comparison Dimension	Traditional Extensive E-commerce Operation Mode	Digital Refined E-commerce Operation Mode	Differentiated Mode Advantages
Traffic Acquisition Mode	Completely dependent on platform public domain paid traffic, passive customer acquisition, rising traffic costs year by year, extremely low operational autonomy	Dual linkage of public domain drainage and private domain precipitation, integrating free natural traffic and precise paid traffic, building independently controllable traffic assets	Get rid of single platform traffic dependence and greatly reduce long-term customer acquisition costs
Core Operation Logic	Low-price volume sales, popular style imitation, passive order receiving, no systematic refined operation system	Data-driven, precise matching, scenario-based marketing, refined user operation, differentiated value competition	Break low-price involution and build sustainable differentiated core competitiveness

Operational Cost Structure	Traffic procurement cost accounts for more than 60%, with high labor and trial costs and prominent resource waste	Lightweight digital tools reduce labor costs, precise operation eliminates invalid investment, comprehensive operational costs reduced by 30%-50%	Realize precise cost reduction and efficiency improvement and optimize enterprise resource allocation efficiency
User Management System	No user stratification, user portrait or long-term operation mechanism, dominated by one-time transactions, user repurchase rate only 10%-15%	Realize user hierarchical management based on RFM model, carry out personalized precise contact and full-life-cycle operation, user repurchase rate reaches 30%-45%	Precipitate high-quality user assets and improve user stickiness and full-life-cycle value
Product Iteration Mechanism	Iteration based on empirical judgment and competitor imitation, iteration cycle of 30-45 days, poor market adaptability	Mining real user demands through big data, small-traffic test and rapid iteration, iteration cycle only 3-7 days, accurate market demand matching	Reduce product trial costs and improve the hit rate and adaptability of new products in the market
Supply Chain Response Capacity	Batch production, serious inventory backlog, lagging market response, high supply-demand mismatch rate and low inventory turnover rate	Data-driven flexible supply chain, realizing small-batch quick response and on-demand production, inventory backlog rate reduced by more than 25%	Optimize inventory structure and greatly improve the market adaptation efficiency of supply chain
Core Profit Model	Profit relying solely on single product price difference, single profit model and weak market risk resistance	Diversified profit system integrating product price difference, user repurchase, private domain value-added and brand premium	Expand enterprise profit space and realize long-term stable profitability
Market Risk Resistance Capacity	Highly dependent on platform policies and market conditions, easy to fall into operational difficulties under industrial fluctuations	Relying on independent traffic assets and diversified operation modes, less affected by external market fluctuations and strong operational stability	Strengthen enterprise operational resilience and enhance sustainable development capacity

4.2 Comparison of Digital Transformation Capabilities Between Large-Medium Enterprises and SMEs

To avoid SMEs blindly copying the heavy-asset transformation model of large enterprises and accurately define the transformation positioning and capability boundaries of SMEs, this paper compares the core digital transformation capabilities of large-medium e-commerce enterprises and traditional small and medium-sized e-commerce enterprises from six dimensions: capital investment, talent reserve, technology application, supply chain transformation, brand capability and transformation model, and clarifies the exclusive transformation path adapted to SMEs, as shown in Table 2.

Comparison Dimension	Large and Medium-Sized E-commerce Enterprises	Traditional Small and Medium-Sized E-commerce Enterprises	Transformation Adaptation Characteristics of SMEs
Digital Capital Investment	Sufficient capital reserves, capable of investing millions of funds to build and iteratively upgrade full-link digital systems	Limited capital reserves, only capable of low-cost lightweight digital tool investment, unable to support heavy-asset transformation	Adapt to incremental transformation mode with lightweight, low investment and high return
Professional Talent Reserve	Complete team structure with full-time special talents for operation, technology, data analysis, brand and compliance	Extreme shortage of professional talents, mostly part-time or general basic staff, no full-time digital operation team	Make up for talent shortcomings relying on platform empowerment and third-party outsourcing services
Digital Technology Application Capacity	Capable of independent R&D and customized development of digital systems, realizing full-link intelligent empowerment	Only capable of applying general lightweight tools, no independent technology R&D and system customization capacity	Realize low-cost technology implementation relying on SaaS tools and public empowerment platforms
Supply Chain Digital Transformation	Completed full-link digital, intelligent and flexible transformation of supply chain with independently controllable supply chain system	Weak supply chain transformation capacity, only capable of partial link digital adaptation, highly dependent on industrial belt supply chain resources	Realize lightweight supply chain collaborative upgrading by leveraging industrial ecological resources
Brand Building Capacity	Mature independent brand influence, capable of realizing brand premium and differentiated competition	No core brand advantages, serious product homogenization, long-term reliance on low-price competition	Focus on vertical segmented tracks to build niche differentiated brand advantages
Core Transformation Mode	Full-link, heavy-asset and systematic digital reconstruction	Partial optimization, lightweight iteration, scenario-based	Incremental transformation featuring rapid small-scale

Comparison Dimension	Large and Medium-Sized E-commerce Enterprises	Traditional Small and Medium-Sized E-commerce Enterprises	Transformation Adaptation Characteristics of SMEs
		breakthrough and ecological empowerment	iteration and targeted breakthroughs

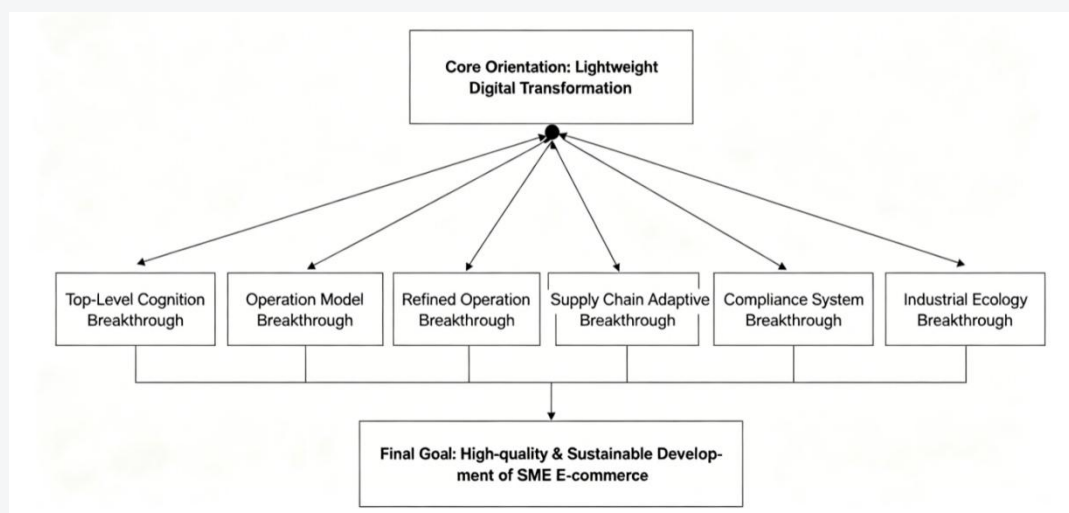
4.3 Summary of Comparative Analysis and Interpretation of Transformation Logic

Two core research conclusions can be drawn from the comprehensive comparative analysis. First, digital refined operation is an irreversible development trend of the e-commerce industry. The traditional operation mode featuring extensive operation, high traffic dependence and low-price involution can no longer adapt to the fierce competition pattern of the stock market. Digital refined upgrading is an inevitable choice for small and medium-sized e-commerce businesses to break through development bottlenecks and achieve long-term operation, yet SMEs do not need to copy the full-link and heavy-asset digital transformation mode of large enterprises. Second, restricted by inherent resource constraints such as capital, talents, technology and supply chain, the optimal breakthrough logic for SMEs focuses on lightweight, low-cost, scenario-based and differentiated development. There is no need for comprehensive reconstruction of the enterprise operation system; only targeted breakthroughs in core operational links are required to make up for internal shortcomings relying on platform ecology, lightweight digital tools and industrial cluster empowerment, realizing progressive transformation with small investment and large returns. This differentiated transformation logic serves as the core theoretical basis for constructing the exclusive breakthrough path for small and medium-sized e-commerce businesses in this paper^[7].

5. Core Breakthrough Paths of SMEs' E-commerce Under Digital Transformation

Based on the conclusions of dilemma sorting, literature review and comparative analysis, combined with the resource endowment characteristics of SMEs and industrial development trends, this paper constructs a six-dimensional e-commerce breakthrough path system covering cognition, model, operation, supply chain, compliance and ecology. The six paths are progressive and coupled with each other, forming a complete transformation closed loop of "cognition guidance - model reconstruction - operation implementation - supply chain support - compliance guarantee - ecological empowerment". Completely different from the heavy-asset transformation mode of large enterprises, this system is highly adapted to the low-cost, low-risk and lightweight transformation needs of SMEs.

Figure 2 Theoretical Framework of Six-Dimensional Digital Breakthrough Path for Traditional SMEs' E-commerce



Note: This framework constructs a closed-loop incremental transformation system for SMEs, which abandons the heavy-asset reconstruction model of large enterprises and adapts to the low-cost, low-risk and scenario-based development characteristics of small and medium-sized e-commerce entities.

As shown in the Figure 2 framework, the six-dimensional breakthrough system constructed in this paper has strong systematicness, completeness and practicality. Centering on the core main line of lightweight digital transformation and aiming at breaking through the six core development bottlenecks of SMEs' e-commerce, the framework builds a hierarchical structure of "top-level cognition - middle-level operation - bottom-level support - external empowerment"

vertically, and realizes collaborative linkage and complementary efficiency improvement among all paths horizontally. Among them, cognitive breakthrough solves the problem of enterprise cognitive deviation and provides strategic guidance for overall transformation; model and operation breakthroughs focus on core market pain points to break traffic dependence and homogeneous involution; supply chain and compliance breakthroughs consolidate the foundation of enterprise operation and avoid digital operational risks; ecological breakthrough makes up for internal enterprise shortcomings relying on external resources and gathers transformation synergy. This framework clearly explains the internal mechanism of differentiated breakthrough for SMEs, providing solid theoretical support and practical guidance for the implementation of small and medium-sized merchants' digital transformation.

5.1 Cognitive Breakthrough: Reshape Digital Cognition and Clarify Lightweight Transformation Strategy

Cognitive innovation is the primary prerequisite for SMEs' e-commerce breakthrough and directly determines the success of transformation. In view of the prevalent problems of lagging digital cognition and deviated transformation positioning in the industry, SMEs must completely abandon traditional commercial thinking and the cognitive misunderstanding of blind heavy-asset transformation, and establish a lightweight digital development concept adapted to their own resource conditions. Enterprise managers need to actively update operational cognition, clarify the core connotation of digital transformation, and define that the core goals of digital upgrading are quality improvement, efficiency enhancement, and precipitation of long-term user and brand value, rather than simple equipment renewal and system stacking. It is necessary to abandon both the conservative thinking of "useless digital transformation" and the radical misunderstanding of "blind investment and comprehensive transformation". On this basis, formulate phased progressive transformation plans combined with the enterprise's own track, product characteristics and target customer groups, and prioritize the implementation of low-cost, high-return and easy-to-implement digital transformation projects. Meanwhile, cultivate full-staff digital awareness within the enterprise, promote the shift of business decision-making from experience-driven to data-driven, and operation mode from passive order receiving to active refined operation, so as to lay a solid cognitive foundation for subsequent model upgrading and operation innovation.

5.2 Model Breakthrough: Break Public Domain Traffic Dependence and Build Public-Private Domain Linkage System

Sustained rising public domain traffic costs and excessive reliance on platform traffic are the core cruxes of profit contraction and growth stagnation of SMEs' e-commerce. The fundamental model breakthrough lies in breaking the single public domain traffic restriction and building a new traffic operation system of "public domain drainage, private domain precipitation and full-domain reuse". On the public domain side, abandon the fixed thinking of pure paid traffic purchase, acquire free natural traffic on content platforms such as Douyin, Xiaohongshu and Video Account through short videos, live broadcast sales and content marketing, and screen accurate customers through refined paid investment to reduce invalid traffic input and resource waste. On the private domain side, precipitate accurate users drained from the public domain into independently controllable carriers such as corporate WeChat, communities and official accounts to build exclusive user assets. Improve user stickiness and promote user repurchase and independent fission through regular content interaction, exclusive rights and interests and personalized customized services. Through in-depth public-private domain linkage, a complete business closed loop of "drainage - precipitation - conversion - repurchase - fission" is formed, completely getting rid of platform traffic restrictions and building long-term and stable differentiated competitive advantages. This low-cost, low-risk and highly adaptive model is fully in line with the resource status of SMEs.

5.3 Operational Breakthrough: Refined Content and User Operation to Build Differentiated Competitive Advantages

Homogeneous low-price involution, extensive operation mode and lack of brand recognition are the core bottlenecks for small and medium-sized e-commerce businesses to break through the profit ceiling and achieve quality upgrading. Promoting all-round refined upgrading of content, users and products relying on lightweight digital tools is the core path to build differentiated competitive barriers. In terms of content operation, leverage low-cost lightweight tools such as AIGC intelligent creation and online design to batch produce pictures, texts, short videos and live broadcast content adapted to the tonality of different platforms, and replace low-price drainage models with professional and scenario-based content value to improve product and store recognition. In terms of user operation, adopt simple SCRM management systems and RFM models to realize hierarchical user classification, formulate differentiated operation strategies for new customers, high-value active customers and dormant old customers, achieve precise personalized contact, and effectively improve user repurchase rate and full-life-cycle value. In terms of product operation, leverage big data tools to explore market consumption trends, user evaluations and competitor dynamics, actively break away from mass track involution, focus on niche segmented tracks to tap differentiated demands, avoid blind popular style imitation, build product characteristics and niche brand advantages in segmented fields, and completely get rid of the vicious cycle

of low-price competition^[8].

5.4 Supply Chain Breakthrough: Lightweight Digital Adaptation to Build a Flexible Supply Chain System

Lagging supply chain response, serious inventory backlog and precise supply-demand mismatch are the underlying core obstacles restricting the long-term high-quality development of SMEs' e-commerce. In view of the practical shortcoming that SMEs have limited funds and cannot fully reconstruct traditional supply chains, lightweight adaptation and industrial ecological collaboration are the optimal paths for supply chain breakthrough. First, deeply rely on local industrial cluster resources, connect source factories with flexible production capacity, and adopt the cooperation mode of small-batch production, rapid supplementary order and on-demand customization to adapt to the fragmented, personalized and small-batch online order demands of e-commerce, and avoid inventory backlog from the source. Second, implement lightweight order and inventory management tools to realize real-time visual monitoring of order, inventory and logistics data, accurately grasp inventory turnover rhythm, and solve the prominent problems of asymmetric traditional supply chain information and lagging market response. Finally, build a data-driven product iteration mechanism, dynamically adjust product structure, production plans and stocking scales based on store sales data, user consumption feedback and market heat data, realize precise matching between market demands and supply chain production, and complete supply chain digital adaptation and upgrading with extremely low capital and technical investment.

5.5 Compliance Breakthrough: Improve Compliance Operation System to Avoid Digital Operational Risks

With the continuous refinement and improvement of the e-commerce industry supervision system, compliance operation has become the bottom line of stable enterprise operation and the most easily ignored operational shortcoming of small and medium-sized merchants. In view of the problems of weak compliance awareness, missing risk prevention and control systems and frequent violations in SMEs' e-commerce, enterprises can build a lightweight, implementable and low-cost compliance operation system. First, carry out regular team compliance training, focusing on mastering core compliance norms such as e-commerce advertising promotion, intellectual property protection, user privacy security and after-sales rights protection handling, and eliminate high-frequency violations such as false promotion, material infringement and illegal marketing from the source. Second, use free third-party compliance detection tools to conduct regular self-inspection and rectification of store detail pages, marketing materials and live broadcast content to avoid platform penalties and civil dispute risks in advance. Finally, standardize the whole process management of user data, strictly abide by relevant laws and regulations on personal information protection, implement hierarchical collection, desensitized storage and compliant use of user information, eliminate data abuse and leakage problems, consolidate the bottom line of digital operation compliance, and ensure long-term stable enterprise operation.

5.6 Ecological Breakthrough: Leverage Policy and Platform Empowerment to Make Up for Enterprise Resource Shortcomings

Insufficient capital, scarce talents and weak technology are hard shortcomings that SMEs cannot break through relying solely on their own strength. Leveraging external ecological empowerment and realizing collaborative development is the core starting point for SMEs to complete low-cost digital breakthroughs. At the policy level, enterprises should actively connect with national and local digital empowerment policies for SMEs and e-commerce quality improvement policies, actively apply for public resources such as digital subsidies, free training and entrepreneurial support, and reduce the capital cost and trial cost of digital transformation. At the platform level, make full use of lightweight SaaS tools, free operation courses and industrial empowerment activities launched by mainstream e-commerce platforms and digital service providers, make up for internal technical and talent gaps at zero or low cost, and quickly improve digital operation capabilities. At the industrial ecological level, actively integrate into local e-commerce industrial clusters, establish in-depth cooperative relationships with upstream and downstream merchants, supply chain enterprises and professional service teams, alleviate the transformation pressure of single enterprises through resource sharing and cluster development, and build a long-term industrial ecology of collaborative symbiosis and mutual benefit.

6. Development Trend Prediction of SMEs' E-commerce Under Digitalization

Combined with the current iteration rhythm of digital technologies, industrial supervision orientation, consumption upgrading trends and industrial practice status, this paper summarizes five core development directions for the future development of traditional SMEs' e-commerce, which can provide reference for long-term enterprise transformation

planning and subsequent academic research.

First, lightweight digital transformation will become the industrial mainstream. In the future, small and medium-sized e-commerce businesses will completely abandon the heavy-asset full-link transformation thinking. The low-cost transformation mode centered on lightweight tool application, platform empowerment and industrial ecological collaboration will be fully popularized. Digital transformation will get rid of formal and superficial upgrading and be deeply implemented in the core operational links of cost reduction, efficiency improvement and quality enhancement.

Second, refined private domain operation will build core competitive barriers. The fading of public domain traffic dividends and rising customer acquisition costs will become the industrial norm. Independently controllable private domain user assets will replace public domain traffic as the core resource for differentiated competition of small and medium-sized e-commerce businesses. Precise personalized operation, scenario-based content marketing and in-depth mining of user full-life-cycle value will become the core focus of SME e-commerce operation.

Third, brand development in segmented tracks will become the key to breakthrough. The living space for homogeneous low-price competition in mass tracks will continue to shrink. SMEs will gradually break away from mass track involution, focus on niche segmented fields, accurately tap vertical user demands relying on digital tools, build differentiated products and niche segmented brands, and realize the fundamental transformation from "low-price volume sales" to "value premium".

Fourth, the degree of industrial ecological collaboration will continue to deepen. The model of independent transformation and closed-door upgrading of single enterprises can no longer adapt to the industrial development rhythm. In the future, SMEs will be deeply integrated into regional industrial clusters, realize resource complementarity relying on multi-dimensional empowerment from the government, platforms, supply chains and service providers, and industrial ecological synergy will become an important support for the digital upgrading of small and medium-sized e-commerce businesses.

Fifth, integrated development of compliance, intelligence and greenization. Industrial supervision will continue to be refined, making compliant operation the bottom line of enterprise survival; the full popularization of AIGC, big data and other intelligent tools will greatly improve the intelligence level of e-commerce operation; green low-carbon and sustainable development will become a new guide for the e-commerce industry. The in-depth integration of the three will become the core feature of the high-quality development of SMEs' e-commerce.

7. Research Conclusions, Deficiencies and Future Prospects

7.1 Research Conclusions

Taking literature review, comparative analysis and inductive summary as core research methods, this paper conducts a systematic review on the breakthrough of SMEs' e-commerce under digital transformation, comprehensively sorts out the industrial development status, core transformation bottlenecks and domestic and foreign research achievements, clarifies the differentiated transformation logic of SMEs relying on two sets of quantitative comparisons, and finally constructs a six-dimensional integrated lightweight breakthrough path system. The core research conclusions are as follows.

First, under the background of stock competition, the traditional extensive, traffic-dependent and low-price-involution e-commerce operation model is unsustainable. Digital refined upgrading is not an optional development path but an inevitable choice for SMEs to break through development bottlenecks and realize long-term survival and quality upgrading.

Second, the transformation dilemmas of traditional SMEs' e-commerce are reflected in six dimensions: cognition, resources, operation, supply chain, compliance and talents. Restricted by their own resource endowments, the full-link and heavy-asset digital reconstruction model of large enterprises is completely inapplicable to small and medium-sized business entities. The incremental upgrading featuring lightweight, low-cost, precision and ecological development is the core transformation logic adapted to the development status of SMEs.

Finally, traditional SMEs can achieve all-round breakthroughs through six collaborative paths: updating digital cognition and establishing lightweight transformation strategies, building a new public-private domain linkage traffic model, promoting refined differentiated operation, completing lightweight digital adaptation of supply chains,

constructing a full-dimensional compliance operation system, and leveraging policy and platform ecological collaborative empowerment. The six paths are progressive and mutually supportive, forming a complete and implementable breakthrough system adapted to the resource conditions of small and medium-sized e-commerce businesses.

7.2 Research Deficiencies

As a review study, this paper systematically integrates existing academic achievements and industrial practical experience and builds a complete theoretical framework for the digital breakthrough of SMEs' e-commerce, but still has certain limitations. First, this paper adopts literature induction and comparative analysis as core research methods without quantitative empirical tests. Subsequent research can verify the actual empowering effect of each transformation path through questionnaire surveys and micro enterprise panel data empirical analysis. Second, this paper takes general traditional SMEs as research objects without distinguishing the differentiated characteristics of different industries, regions and enterprise scales. Subsequent research can carry out special research on segmented scenarios to further improve the pertinence and adaptability of research conclusions. Third, part of the industrial data adopts general industrial statistical indicators, and future research can optimize research accuracy with first-hand field survey data of enterprises^[9].

7.3 Future Prospects

The continuous iteration of digital technologies and improvement of industrial ecology will continuously reshape the competition logic and development pattern of SMEs' e-commerce. At the academic level, future academic circles can focus on in-depth research directions such as empirical analysis of segmented industries, quantitative evaluation of transformation path effects, scenario adaptability of lightweight digital tools and long-term private domain operation mechanism, so as to further improve the theoretical system of SMEs' digital transformation. At the industrial practice level, with the improvement of policy empowerment, technology popularization and ecological system, more traditional.

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