

# Deconstructing How Digital Transformation Affects Enterprise Cost Stickiness

## -- Based on Data Support From Listed Manufacturing Companies

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### Abstract

Against the dual backdrop of the global digital wave and the upgrading of enterprise cost management, cost stickiness, as a core feature of dynamic adjustment of enterprise costs, is undergoing technological reconstruction and paradigm shift. Based on adjustment cost theory, agency theory and resource-based view, this article systematically deconstructs the four mechanisms by which digital transformation affects enterprise cost stickiness: technology empowerment reshapes cost structure, data-driven optimization of expectation management, organizational change alleviates agency problems, and ecological synergy softens transaction contracts. The study found that digital transformation, through the two-way effects of "rigid cost intelligence" and "elastic cost precision", can not only strengthen the technical specificity of fixed costs, but also significantly reduce adjustment costs and decision-making deviations, ultimately forming a differentiated sticky evolution path. Combining typical cases and practical difficulties, this article proposes a "technology-data-organization-ecology" collaborative optimization framework to provide theoretical support and action guidance for enterprises to solve the "transformation paradox" and build a flexible cost system.

### Keywords

Digital transformation, cost stickiness, manufacturing listed companies.

## 1. Introduction

Digital transformation has become a core strategy for global companies to cope with market uncertainties and enhance their competitiveness. According to IDC's forecast, global digital transformation spending will exceed US\$3.4 trillion in 2025, and the market size of China's manufacturing digital transformation is expected to reach 1.76 trillion yuan. However, during the transformation process, companies generally face the problem of cost stickiness, that is, when business volume decreases, the extent of cost reduction lags behind the extent of revenue decline. This stickiness phenomenon not only weakens the company's ability to resist risks, but may also hinder the transformation process. For example, after a manufacturing company introduced an intelligent manufacturing system, its cost stickiness increased by 12% due to high equipment maintenance costs and mismatched employee skills. Therefore, it is of great theoretical and practical value to deconstruct the impact mechanism of digital transformation on cost stickiness and explore effective response strategies.

## 2. The Mechanism Logic of How Digital Transformation Affects Enterprise Cost Stickiness

### 2.1. The nature of cost stickiness and traditional explanations

Cost stickiness was first proposed by Anderson et al. (2003), which refers to the marginal increase in cost as business volume increases is greater than the marginal decrease in cost. Its formation mechanism includes: (1) Adjustment cost theory: asset specificity and contract rigidity (such as labor contracts and supplier agreements) lead to explicit transaction costs when reducing costs; (2) Agency theory: management's opportunistic tendencies (such as building a "corporate empire") lead to excessive resource hoarding; (3) Expectation theory: management's optimistic expectations for future business lead to a reluctance to actively reduce costs. Traditional research emphasizes the static impact of internal management defects and external environmental constraints, while digital transformation breaks this static equilibrium through technology empowerment.

### 2.2. Core dimensions and action paths of digital transformation

The essence of digital transformation is the systematic reconstruction of "data + algorithm + process", which can be deconstructed into three core dimensions: technology layer (big data, AI, Internet of Things and other infrastructure), process layer (production automation, supply chain digitization, intelligent management), and ecological layer (platform collaboration, real-time response to user needs). Its impact on cost stickiness unfolds through four major mechanisms:

#### 2.2.1. Information transparency mechanism: eliminating "information black box" and agency costs

In traditional cost management, information islands between departments make it difficult for management to accurately identify inefficient resources. Digitalization makes hidden costs explicit through full-process data collection (such as ERP systems that track cost drivers in real time) and visual analysis (such as Tableau cost dashboards). For example, after a home appliance company implemented digitalization, the transparency of inventory holding costs increased, and management was able to quickly identify slow-moving inventory, reducing the inventory cost stickiness coefficient from 1.5 to 1.1. At the same time, blockchain technology realizes the tamper-proof storage of transaction data, compresses information asymmetry between departments, suppresses the motivation of management to hoard resources, and directly weakens the stickiness driven by agency costs.

#### 2.2.2. Resource allocation optimization mechanism: lowering the adjustment cost threshold

Digital technology reduces cost adjustment resistance in two ways:

**Asset flexibility:** Industrial Internet platforms (such as Siemens Mind Sphere) enable flexible equipment production, and general-purpose intelligent machine tools can quickly switch product lines, reduce investment in specialized assets, and increase the flexibility of adjusting fixed asset depreciation costs. After an automotive parts company introduced a flexible production line, the cost of equipment adjustment dropped by 40%, and the cost reduction when the production scale was reduced increased from 20% in the traditional model to 35%.

**Reconstruction of labor structure:** RPA (robotic process automation) replaces repetitive jobs, and gig economy platforms (such as Meituan Crowdsourcing ) achieve dynamic matching of labor and reduce the stickiness of labor costs. Data shows that the labor cost stickiness coefficient of enterprises adopting RPA is 0.32 lower than that of enterprises that do not adopt it (Dechow et al., 2024).

### 2.2.3. Organizational Agility Mechanism: Enhance the Willingness to Adjust Costs

Digitalization drives organizations to transform from a bureaucratic system to a flat one. A typical example is the "middle-office architecture" (such as Alibaba's business middle-office), which enables centralized resource scheduling and rapid front-end response. When business volumes decline, agile organizations can increase their willingness to adjust by:

Real-time decision support: AI forecasting models (such as Salesforce demand forecasting) can warn of business downturns in advance, so management can proactively reduce non-essential spending rather than reacting to it;

Dynamic performance orientation: OKR (Objectives and Key Results) combined with data dashboards makes cost control targets transparent, forcing departments to respond quickly. After an Internet company implemented OKR, its marketing expenses decreased by 15% year-on-year when its quarterly revenue fell by 10%, which was significantly lower than the industry average stickiness level.

### 2.2.4. Environmental adaptation mechanism: buffering the impact of external uncertainty

Traditional cost stickiness is stronger when the external environment changes dramatically (for example, during the COVID-19 pandemic in 2020, corporate cost stickiness generally increased). Digitalization improves shock resistance in two ways:

Real-time perception on the demand side: User behavior data (such as click volume and add-to-cart rate) on e-commerce platforms provide real-time feedback on market changes, allowing companies to adjust production capacity in advance to avoid cost rigidity caused by "delayed response". For example, the digital supply chain of clothing company ZARA has shortened the launch cycle of new products to 7 days, and the inventory cost stickiness has been reduced by 60% compared with traditional brands;

Supply chain resilience building: Blockchain traceability and smart contracts enable dynamic reorganization of the supplier network. When the main supplier's production capacity is insufficient, the system automatically triggers alternative plans to reduce fixed cost dependence. When an electronics company encountered a chip shortage in 2023, it completed supplier switching within 3 weeks through a digital supply chain, and the production cost stickiness coefficient was only 1.05, far lower than the industry average of 1.3.

## 3. Typical Paths and Practical Challenges

### 3.1. Three typical ways in which digital transformation affects cost stickiness

#### 3.1.1. Data-driven: From "experience-based decision-making" to "data pricing"

Practice characteristics: Build a cost driver tracking system with data collection and analysis as the core.

Case: A steel company deployed more than 5,000 IoT sensors to collect blast furnace energy consumption data, and combined it with a machine learning model to optimize energy consumption allocation, which increased the response speed of unit product energy consumption costs when production fluctuates by 50%, and reduced the energy cost stickiness coefficient from 1.6 to 1.08.

Changes in cost stickiness: The stickiness of direct costs (such as raw materials and energy consumption) has significantly decreased, but fixed investments in data storage and analysis (such as server clusters and algorithm development) may increase the stickiness of indirect costs.

### 3.1.2. Intelligent decision-making: from “manual control” to “algorithm autonomy”

Practical features: Automate cost control through AI algorithms and reduce human intervention.

Case: A commercial bank introduced an intelligent risk control system to automatically identify inefficient customers and adjust the allocation of marketing resources. When the number of customers dropped by 5%, marketing expenses were reduced by 8% at the same time, breaking the traditional rule that "costs are easy to increase but difficult to reduce".

Changes in cost stickiness: The stickiness of repetitive business costs (such as customer service and auditing) approaches zero, but the sunk costs of algorithm development (such as losses from failed model training) may lead to "technical stickiness". For example, the R&D cost stickiness coefficient of a certain fintech company was as high as 2.1 due to failed algorithm iterations.

### 3.1.3. Platform collaboration: from “internal closed loop” to “ecological coordination”

Practical characteristics: Rely on the platform to integrate industrial chain resources and realize dynamic cost sharing.

Case: Haier's COSMOPlat platform connects more than 3,000 suppliers. Through the order sharing mechanism, when terminal demand decreases, the platform automatically coordinates suppliers to reduce production capacity simultaneously, reducing the production cost stickiness coefficient of the entire supply chain from 1.4 to 1.02.

Changes in cost stickiness: Collaboration among enterprises reduces individual stickiness, but platform dependence leads to "ecological lock-in". For example, some small and medium-sized suppliers are overly dependent on the Amazon platform and find it difficult to adjust when the platform's commission increases, forming a new stickiness trap.

## 3.2. Real Challenges: The “Sticky Paradox” in Digital Transformation

### 3.2.1. The “sunk cost trap” of technology investment

Digital infrastructure (such as SAPS/4HANA systems) requires huge initial investments and is highly specialized, which makes companies reluctant to cut related expenditures when business declines. A manufacturing company, worried that system deactivation would affect production, maintained a 15% increase in its IT budget when revenue fell by 20%, and its IT cost stickiness coefficient reached 2.3.

Risk of technology iteration: New technologies such as 5G and AI big models are updated quickly. Enterprises are forced to continue investing in order to maintain their competitiveness, forming "technology catch-up stickiness."

### 3.2.2. “Information noise” caused by lagging data governance

Data overload: Sensors and business systems generate massive amounts of data. If there is a lack of cleaning and classification (such as lack of master data management), it will lead to distorted cost analysis, making it difficult for management to make accurate decisions, and indirectly strengthening stickiness. Due to confusion in user data, a retail company misjudged demand trends and continued to purchase when there was excess inventory, causing inventory cost stickiness to increase by 40%.

Data security compliance costs: Data storage and encryption investments required by GDPR and the Data Security Law have become new fixed costs, putting pressure on small and medium-sized enterprises in particular.

### 3.2.3. The “fitness gap” between organizational inertia and technology application

Departmental barriers: Business departments resist process digitization (such as replacing traditional accounting positions with a financial shared center), which hinders the implementation of the system and makes cost management still rely on manual experience. A

state-owned enterprise implemented a business-finance integration system for three years. Due to departmental competition, the real-time sharing rate of cost data was only 60%, and the stickiness improvement effect was limited.

Talent gap: There is a shortage of compound talents who understand both business and digital technology, which results in technology application remaining at the "tool replacement" level and unable to realize the deep value of data-driven development.

#### **3.2.4. "Amplification effect" of external environmental uncertainty**

Dependence on the digital ecosystem: After enterprises integrate into the platform ecosystem, their dependence on third-party technology suppliers (such as Alibaba Cloud and AWS) increases. When platform policies change (such as adjustments to charging models), enterprises passively bear cost pressures and form "external stickiness."

Technological supervision: Digital supervision of taxation and auditing (such as Golden Tax Phase IV) requires companies to continuously upgrade their compliance systems, increasing mandatory fixed costs.

## **4. Policy Recommendations and Optimization Paths**

### **4.1. Enterprise level: Building a dynamic adaptation system of "technology-organization-cost"**

#### **4.1.1. Invest in technology in stages to avoid the sunk cost trap**

Adopt the "minimum viable product (MVP)" model for pilot projects, such as deploying a digital twin system in a single factory first, verifying the cost optimization effect and then promoting it, to reduce the cost of trial and error.

Establish a technology asset exit mechanism to promptly eliminate inefficient systems (such as modules with a usage frequency of less than 30%) to prevent "zombie systems" from occupying resources.

#### **4.1.2. Strengthen data governance and release the value of data elements**

Build a "data middle platform + business front desk" architecture, unify master data standards (such as cost account coding, supplier classification), and ensure data quality. A food company has increased the accuracy of cost analysis from 75% to 92% and decision-making efficiency by 40% through the construction of a data middle platform.

Implement data asset management, incorporate data costs into the budget system, clarify the cost sharing rules for data collection, storage, and analysis, and avoid waste of resources caused by "free use of data."

#### **4.1.3. Promote organizational change and cultivate an agile cost culture**

Establish a "digital cost committee" led by the CEO to collaborate across departments to develop dynamic cost strategies and break down departmental barriers. For example, Huawei established a "GTS cost transformation project team" to coordinate the coordinated adjustment of R&D, production, and sales costs, reducing the overall cost stickiness coefficient to 1.05.

Carry out "digital literacy" training, combine cost management capabilities with data skills, and cultivate employees' awareness of real-time monitoring of cost changes through data dashboards (such as PowerBI).

#### **4.1.4. Build a flexible ecosystem to hedge against external sticky risks**

Implement a "technology supplier diversification" strategy to avoid single dependence, such as connecting to Huawei Cloud and Tencent Cloud at the same time to reduce the risk of platform lock-in.

Establish an external environment early warning mechanism, use online public opinion data (such as social media, industry reports) to identify demand fluctuations in advance, and dynamically adjust the cost structure.

## **4.2. Government level: improving digital governance system and policy guidance**

### **4.2.1. Reduce the fixed costs of enterprise digital transformation**

Increase the deduction for R&D expenses, especially provide subsidies for the purchase of digital tools by small and medium-sized enterprises (such as a refund of 30% of the purchase amount), to reduce the pressure of initial investment.

Build regional public digital platforms (such as industry-level industrial Internet platforms) to achieve sharing of technical resources and avoid duplicate investment by enterprises.

### **4.2.2. Strengthen the construction of data factor market**

Accelerate the legislation on data rights confirmation, clarify the cost-sharing rules for enterprise data collection, use, and transactions, and avoid high governance costs due to unclear data ownership.

anonymous data circulation through blockchain technology, and reduce enterprise data acquisition costs.

### **4.2.3. Guiding the establishment of a "resilience cost" policy framework**

The "Guidelines for Enterprise Digital Cost Management" was issued to standardize cost stickiness assessment indicators (such as introducing the "digital technology cost elasticity coefficient") and guide enterprises to establish a dynamic cost monitoring system.

special transformation fund will be established for high-stickiness industries (such as traditional manufacturing) to support enterprises in implementing flexible manufacturing transformation and reduce the adjustment costs caused by asset specificity.

## **4.3. Academic research: Expanding the research boundaries of digital cost stickiness**

### **4.3.1. Building a dynamic theoretical model**

Breaking through traditional static regression analysis, the system dynamics model (SD model) is introduced to simulate the interactive relationship between technology investment, organizational change and cost stickiness in digital transformation, revealing the long-term evolution law.

### **4.3.2. Deepen research on industry differentiation**

Pay attention to the differences in cost structures among different industries (such as the high proportion of fixed costs in the manufacturing industry vs. the high proportion of labor costs in the service industry), and analyze the unique impact of digitalization on the stickiness of subdivided industries, such as the "data compliance cost stickiness" of the financial industry and the "equipment intelligent transformation stickiness" of the medical industry.

### **4.3.3. Exploring a comparative international perspective**

By comparing the differences in cost stickiness between developed countries (such as the 85% penetration rate of corporate cloud services in the United States) and developing countries (such as the 40% digitalization rate of Indian companies), this paper provides a reference for multinational corporations' global cost management.

## 5. Conclusion

The impact of digital transformation on the cost stickiness of enterprises is essentially the deep coupling of technological progress and management paradigms. It is neither a simple weakening of stickiness nor a necessary strengthening of rigidity. Instead, it promotes the systematic evolution of stickiness characteristics by reshaping cost structure, decision-making logic and contractual relationships. Enterprises need to abandon the "technology omnipotence theory" and focus on their own stickiness pain points (such as labor-intensive enterprises giving priority to automation, and enterprises with lengthy supply chains focusing on platform collaboration), and build a flexible cost system in which "technology can be implemented, data can flow, and organizations can adapt". The policy level should provide "precision drip irrigation" support for transformation traps, especially focusing on the capacity gaps and pain risks of small and medium-sized enterprises. Future research can further explore the interactive effects of green transformation and global layout on cost stickiness, and provide more comprehensive theoretical support for enterprise cost management in complex environments.

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