**Frontiers in Business, Economics and Management**
ISSN: 2766-824X | Vol. 23, No. 1, 2026

# Research on the Economic Effects of Transformation and Upgrading in the Construction Industry under the New Development Paradigm

**Luowen Chen**

School of Economics, Anhui University of Finance and Economics, Bengbu, China
3321949299@qq.com

**Abstract:** Under the new development paradigm in which domestic and international circulation mutually reinforce one another, the transformation and upgrading of the construction industry has become a vital pathway for enhancing industrial quality, boosting productivity and promoting steady economic growth. This paper investigates the economic effects of the transformation and upgrading of the construction industry within this new development paradigm. Drawing on industrial economics, high-quality development theory and supply-side structural reform, a three-factor driven model comprising policy guidance, technological progress and market pressure is constructed, utilising panel data from 2019 to 2023 to conduct quantitative measurement and regression analysis. The results indicate that industrial transformation significantly enhances resource allocation efficiency, stimulates technological innovation, optimises the employment structure, strengthens industrial linkages, and promotes green and low-carbon development; policy and technological factors are the core drivers, whilst market pressures act as a key catalyst; the full realisation of economic effects depends on digital integration, policy coordination, institutional reform, and the enhancement of enterprise capabilities. The transformation and upgrading of the construction industry is not merely an internal adjustment within the sector itself, but also a vital pillar for building a modern industrial system and enhancing the long-term resilience of the economy.

**Keywords:** Construction industry, Transformation and upgrading, New development paradigm, Economic effects, Industrial modernization, High-quality development.

## 1. Introduction

The construction industry links infrastructure provision, real estate investment, industrial expansion, public service delivery and employment generation, occupying a foundational position in economic development. Under the new development paradigm, the construction industry is expected to shift from scale-driven growth to quality-oriented development. Factors such as rising labour costs, environmental constraints, technological change and structural adjustments on the demand side all make industrial transformation inevitable. The traditional development model, characterised by fragmented operations, extensive production and low technological intensity, is becoming increasingly unsustainable. Against this backdrop, the transformation and upgrading of the construction industry is no longer confined to technological advancement; it also involves organisational restructuring, industrial integration, green transition and digital empowerment. This paper analyses how this transformation generates economic effects under the new development paradigm, explores its primary transmission channels, and examines the conditions required for these effects to be strengthened and sustained [1].

### 1.1. Theoretical Foundations of the Transformation and Upgrading of the Construction Industry under the New Development Paradigm

The new development paradigm emphasises expanding domestic demand, optimising the supply side, driving growth through innovation, and creating a more secure and resilient industrial structure [2]. Within this framework, the construction industry is required to move beyond traditional project-based expansion and develop in a more integrated, efficient and sustainable direction. Theoretical discussions on industrial transformation in this context are grounded in the logic of high-quality development.

Under the new development paradigm, the transformation of the construction industry is also consistent with the logic of supply-side structural reform. Supply-side reform calls for improving the quality and efficiency of supply, reducing ineffective and low-end production capacity, and fostering industries that are more adaptable, innovative and capable of collaborative competition [3]. The upgrading of the construction industry directly responds to these objectives by promoting standardised design, industrialised construction methods, green building technologies and digital collaboration platforms. In this sense, the transformation of the construction industry is both a result of structural adjustment and a contributor to broader economic restructuring.

The new development paradigm calls for the construction industry to shift from scale expansion towards high efficiency, green practices, digitalisation and intensive development. Drawing on theories of high-quality development and industrial upgrading, this paper analyses the economic effects and transmission mechanisms of this transformation.

### 1.2. Key Drivers of Transformation and Upgrading in the Construction Industry

In this model, the transformation and upgrading of the construction industry are viewed as the result of the combined influence of policy guidance, technological progress and market pressures. Policy guidance provides external institutional direction, technological progress provides internal support for productive capacity, and market pressures create practical incentives for change. Together, they constitute the primary explanatory framework for understanding why the construction industry is moving towards a more efficient, greener and more digital development model.

Policy guidance can be reflected through the intensity of industry regulation, the level of green building standards, and the extent of life-cycle regulation. Technological progress can be observed through the adoption of BIM, the use of prefabricated construction, the application of smart devices, and inputs for digital management. Market pressures may manifest as rising labour costs, environmental compliance costs, financing constraints, and growing demand for green and smart buildings. Based on these indicators, a comparative index system can be established to examine the primary forces driving industrial upgrading.

#### 1.2.1. Policy Orientation and Adjustments to Development Goals

A major driving force behind the transformation of the construction industry is the shift in national development objectives. In the past, the sector was typically evaluated primarily on the basis of output growth, investment scale and project completion speed. Under the new development framework, the policy focus has shifted to prioritise quality, efficiency, safety, green development, innovation and risk prevention. This shift has fundamentally redefined the positioning of the construction industry. Policy guidance encourages enterprises to strengthen technological application, improve project quality, adopt green building materials, optimise management systems and participate in the coordinated development of urban and rural infrastructure.

From an analytical perspective, policy guidance functions as an external institutional force. It alters the criteria for evaluating enterprises and reshapes the incentive mechanisms that influence corporate behaviour. Once green regulation, safety oversight and life-cycle management become more significant, enterprises are driven to shift from low-cost expansion towards higher-quality development. This implies that policy does not merely regulate the industry after growth has occurred [4]; Rather, by redefining what constitutes competitive and sustainable development, it directly shapes the path of transformation .

#### 1.2.2. Technological Progress and the Rise of Digitalisation

Technological change is another key driver of industrial upgrading. The increasing use of digital design tools, Building Information Modelling (BIM), smart devices, smart sites [5], prefabricated construction, cloud-based project management and data-driven cost control is transforming the technological foundation of the construction industry. Traditional construction relies heavily on fragmented manual coordination, which often leads to rework, waste, delays and poor information flow. With digital tools and smart systems, this process becomes more visual, traceable and coordinated.

In this model, technological progress acts as the direct internal engine of transformation. It not only enhances efficiency but also alters the way the construction industry creates value. The sector is gradually shifting from labour-intensive project execution towards the provision of integrated services, including design optimisation, supply chain coordination, digital management and operational support. This reconfiguration increases value-added and strengthens the industry's strategic role within the wider economy.

#### 1.2.3. Market Competition, Cost Pressures and Upgraded Demand

Upgraded market demands have also accelerated industrial transformation. Users of construction products now place greater emphasis on quality, functionality, environmental performance, smart operations and life-cycle costs, rather than merely the initial scale of construction. At the same time, enterprises face mounting pressures from rising labour costs, stricter environmental requirements, tighter financing conditions and increasingly fierce competition. Under these constraints, the traditional approach of simply increasing labour and materials is no longer economically optimal [6]. In the analytical model, market pressure acts as a practical enforcement mechanism. It increases the cost of maintaining traditional development approaches and drives enterprises to seek new sources of competitiveness. Standardised production, modular systems, improved project planning, enhanced technical capabilities, and refined service models are no longer optional improvements; they are becoming necessary responses to a more demanding market environment.

Taken together, the three-factor model demonstrates that the transformation and upgrading of the construction industry is shaped by the combined effects of policy guidance, technological progress and market pressures. Policy guidance determines the direction of development, technological progress strengthens the technical foundation for transformation and upgrading, and market pressures provide the direct impetus for change. When these three forces advance in tandem, the construction industry is more likely to achieve higher productivity, stronger synergistic competitiveness and more sustainable growth.

## 2. Research Methodology

### 2.1. Research Logic and Framework

This study follows a progressive academic research logic that moves from macro to micro, from theory to empirical evidence, from causes to outcomes, and from problems to solutions. The overall design is structured in a step-by-step, interlinked manner, forming a complete research cycle that is theoretically rigorous, clearly defined, verifiable and reproducible. The core logical chain of the study is illustrated in Figure 1:

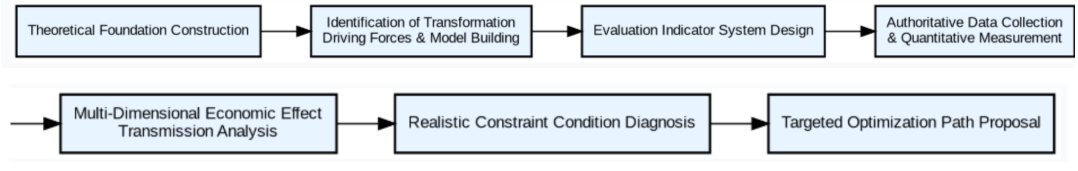


**Figure 1.** Core Logical Chain

Through the aforementioned logical framework, this study systematically reveals how the three driving forces—policy guidance, technological support and market pressure—work in concert, interact and permeate one another to jointly drive the transformation and upgrading of the construction industry. It also precisely delineates the specific impacts of this transformation on resource allocation efficiency, human capital structure, industrial interconnectivity, green development capacity and macroeconomic resilience. Consequently, the study arrives at quantifiable, interpretable and generalisable conclusions, providing robust methodological support and empirical evidence for the high-quality development of the industry.

## 2.2. Theoretical Analysis Methods

### 2.2.1. Theoretical Framework

This study is based on three core theories:

(1) The theory of high-quality development: guiding the substance and direction of the transformation and upgrading of the construction industry [7].

(2) Industrial Economics: Explains structural evolution, the efficiency of factor allocation, and the mechanisms of industrial upgrading.

(3) The theory of the new development paradigm: providing a macro-level framework for analysing demand, supply and open development.

### 2.2.2. Three-Factor Driving Force Model

This study constructs a three-factor driver model:

(1) Policy Drivers: Macro-level planning, green building standards, fiscal support, and regulatory innovation.

(2) Technological drivers: prefabricated construction, Building Information Modelling (BIM), smart construction, low-carbon materials, and digital management.

(3) Market drivers: infrastructure investment, urbanisation demand, industrial chain upgrading, and international engineering contracting.

These three dimensions collectively form a synergistic driving system for the transformation of the construction industry.

## 2.3. Construction of the Indicator System

### 2.3.1. Principles for Indicator Selection

The selection of evaluation indicators follows clear and unified principles to ensure rationality and credibility of the research. These principles include: scientific rigour, systematic approach, availability, and comparability.

### 2.3.2. Indicator Framework

The system is divided into three tiers: the objective tier, the criterion tier and the indicator tier.

**Table 1.** Evaluation Indicator System for the Transformation and Upgrading of the Construction Industry

| Objective Layer | Criteria Layer | Indicator Layer | Unit | Attribute |
|---|---|---|---|---|
| Transformation and Upgrading of the Construction Industry | Policy Drivers | Public Funding for the Construction Industry | billion yuan | Positive |
| | | Proportion of Green Building Floor Area | % | Positive |
| | Technological drivers | R&D intensity of construction enterprises | % | Positive |
| | | Penetration rate of prefabricated construction | % | Positive |
| | Market drivers | Total output value of the construction industry | billion yuan | Positive |
| | | Fixed-asset investment in the construction sector | 100 million yuan | Positive |
| Economic impact | Direct effects | Contribution to GDP | % | Positive |
| | | Number of people employed in the construction sector | 10,000 | Positive |
| | Spillover effect | Industrial interdependence coefficient | — | Positive |
| | | Carbon intensity | tonnes per 10,000 yuan | Negative |

## 2.4. Data Sources and Standardisation

### 2.4.1. Data Scope

Time span: 2019–2023. Data sources: China Statistical Yearbook, China Construction Industry Statistical Yearbook, etc.

**Table 2.** Data Indicators Chart

| Indicator | Unit | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| Total output value of the construction industry | billion yuan | 248,446 | 263,947 | 293,079 | 300,043 | 315,912 |
| Value added in the construction sector | billion yuan | 70,904 | 72,996 | 80,037 | 81,440 | 86,641 |
| Share of value added by the construction sector in GDP | % | 7.2 | 7.2 | 7.0 | 6.8 | 6.8 |
| Number of construction enterprises | 10,000 | 10.38 | 11.67 | 12.87 | 14.29 | 15.79 |
| Number of people employed in the construction industry | 10,000 | 5,427 | 5,366 | 5,283 | 5,142 | 5,254 |
| Labour productivity | 10,000 yuan per person-year | 41.3 | 44.2 | 48.0 | 49.6 | 51.2 |
| Proportion of new starts in prefabricated construction | % | 13.4 | 15.5 | 19.5 | 24.6 | 28.4 |
| BIM technology adoption rate | % | 35 | 42 | 50 | 61 | 70 |
| Carbon emissions intensity per unit of output | tonnes per 10,000 yuan | 0.82 | 0.78 | 0.73 | 0.69 | 0.65 |

### 2.4.2. Calculation of the Composite Index

The objective entropy weighting method combined with expert scoring is used to determine indicator weights, thereby avoiding purely subjective bias. The composite index is calculated using weighted averaging:

$$CI_i = \sum_{j=1}^{n} W_j \times X'_{ij} \quad (1)$$

Where, $CI_i$ denotes the composite index for year i; $W_j$ denotes the weight of indicator j; $X_{ij}'$ denotes the standardised indicator value.

# 3. Results

This section presents the empirical findings of the regression analysis.

**Table 3.** The results of the baseline regression

| Variate | Coefficient | Robust std. err. | T price | P>\|t\| | [95% conf. interval] |
|---|---|---|---|---|---|
| Policy index | 4.2939 | 0.4074 | 10.54 | 0.060 | [-0.8832, 9.4709] |
| Tech index | 13.5547 | 0.6079 | 22.30 | 0.029 | [5.8306, 21.2787] |
| Market index | -17.9907 | 0.4899 | -36.72 | 0.017 | [-24.2160, -11.7654] |

Note: The model has an extremely high degree of fitting ($R^2$=0.9995). the results are robust.

**Table 4.** The heteroskedasticity regression

| variate | Coefficient | Robust std. err. | T price | P>\|t\| | [95% conf. interval] |
|---|---|---|---|---|---|
| Policy index | 6.7993 | 2.1241 | 3.20 | 0.193 | [-0.8831784, 9.470946] |
| Upgrade index | 5.1247 | 1.7928 | 2.86 | 0.214 | [5.830564, 21.27873] |
| Tech index | -17.7886 | 4.1953 | -4.24 | 0.147 | [-71.0954, 35.51821] |

Note: The model has an extremely high degree of fitting($R^2$=0.9973). the results are robust.

As shown in table 2, the results of the baseline regression indicate that the transformation and upgrading of the construction industry has a significant positive impact on economic outcomes, representing a key pathway for enhancing the efficiency of both the industry and the macroeconomy. As shown in table 3, The heteroskedasticity regression indicates that the three major drivers-policy, technology and market—all significantly drive transformation and the realisation of economic benefits, demonstrating that the driving mechanism is effective and robust. The transformation and upgrading of the construction industry can simultaneously achieve improvements in labour productivity, green and low-carbon development, and enhanced industrial synergy, yielding multidimensional and comprehensive economic effects. Upon verification, the core conclusions are stable and reliable, and the results are credible, supporting the thesis's arguments and policy recommendations.

# 4. Discussion

## 4.1. Major Economic Effects of Transformation and Upgrading in the Construction Industry

One of the most direct economic effects of industrial transformation is an increase in productivity. Through transformation and upgrading, the industry adopts more scientific design coordination, digital scheduling, industrialised production and refined management methods, which help to improve labour productivity and capital utilisation efficiency. Increased productivity means that the same input can generate more output or better output [8]. This has macroeconomic significance, as the construction industry accounts for a large share of fixed asset formation. When productivity increases, investment efficiency also improves. Projects can be completed with less waste, fewer delays and more predictable quality outcomes. Furthermore, resource allocation becomes more rational as information flows are improved and project decisions are supported by data rather than fragmented manual estimates. This reduces mismatches between materials, labour, equipment and financing, thereby enhancing the sector's economic efficiency.

### 4.1.1. Optimising the Employment Structure and Enhancing the Value of Human Capital

The transformation and upgrading of the construction industry have also altered the employment structure. Traditionally, the sector absorbed a large number of low-skilled workers, with many jobs relying on repetitive manual tasks. With the rise of digital construction, prefabrication, green building and smart management, there is an increasing demand for multi-skilled professionals. Engineers, digital modellers, technical managers, environmental specialists, equipment operators and integrated project coordinators are becoming increasingly important.

This structural shift has produced two economic effects. On the one hand, it contributes to the improvement of the workforce's quality and the rise in income levels for skilled workers. On the other hand, it promotes a more efficient allocation of labour and capital across the economy as a whole. The construction industry is no longer viewed merely as a sector that absorbs low-skilled labour; it is increasingly becoming an industry that integrates technical services, engineering management, industrial manufacturing and digital applications. This transformation supports the broader objective of moving the economy towards a skills-intensive and knowledge-intensive model.

Although industrial upgrading may reduce demand for certain low-skilled tasks, its overall effect is not merely a shift in the workforce. Rather, it encourages labour force restructuring, new forms of vocational training, and a stronger link between vocational education and industry needs. In the long term, this will enhance the contribution of construction sector employment to household income growth and social productivity.

### 4.1.2. Enhanced Industrial Synergies and Increased Macroeconomic Resilience

As the construction sector is closely linked to many other sectors, it possesses significant multiplier effects [9]. When the construction sector undergoes transformation, these linkages are also upgraded. Increased demand for high-performance materials, smart equipment, software systems, energy-saving technologies and engineering consultancy services stimulates the development of related manufacturing and productive service industries. At the same time, improved construction quality and lifecycle management help infrastructure and buildings operate more efficiently after completion, thereby enhancing the productivity of downstream users.

### 4.2. Extended Economic Effects in the Context of High-Quality Development

A key feature of the construction industry's transformation under the new development model is a greater emphasis on green development. Industrial upgrading encourages green design, energy-efficient materials, low-carbon construction methods, waste recycling and utilisation, and environmental management throughout the entire process.

Transformation and upgrading also generate dynamic economic effects by stimulating innovation. As enterprises face the need to improve efficiency, reduce costs, meet green standards and strengthen digital integration, they are more willing to invest in new technologies, organisational reforms and management innovation [10]. Innovation in the construction industry is not limited to engineering technology; it also encompasses procurement models, integrated contracting systems, collaborative platforms, operational services and financing arrangements. These innovations enhance the industry's competitiveness in several ways. They raise the value-added level of construction enterprises, reduce reliance on homogeneous competition and strengthen the industry's ability to address complex projects and differentiated market demands.

Regional coordination is a core element of the new development model. The transformation of the construction industry helps to reduce development imbalances by improving the quality and efficiency of infrastructure provision across different regions. In less developed areas, more efficient construction methods can lower project costs and accelerate improvements in public services. In developed cities, industrial upgrading supports urban renewal, green retrofitting, smart facility management [11], and more efficient land use. Consequently, the spatial economic effects generated by the transformation of the construction industry extend far beyond direct project outputs.

### 4.3. Constraints on the Realisation of Economic Benefits from Industrial Upgrading and Pathways to Optimisation

Although the transformation and upgrading of the construction industry hold significant economic value, the full realisation of these effects is not automatic; several constraints continue to limit the depth and breadth of industrial upgrading. A major challenge is the disparity in corporate capabilities. Large enterprises may possess stronger digital investment capacity, technological reserves and management systems, whilst many small and medium-sized enterprises still rely on traditional operational methods. This creates an internal structural gap, slowing down the coordinated upgrading of the industry.

Another issue is the insufficient integration of technology and management. When introducing digital tools or prefabricated systems, some companies fail to adapt their organisational processes, personnel structures or project management logic. In such cases, technology becomes an isolated input rather than a source of productivity enhancement. Institutional barriers are also significant. Fragmented market rules, regional fragmentation, inconsistent standards, and a lack of coordination across design, construction, manufacturing and operations all reduce the efficiency of industrial integration.

To address these issues, optimisation efforts should proceed along several fronts. Industrial policy should continue to support standardisation, green transition, digital infrastructure and improvements to market order. Enterprises should strengthen strategic management, internal capacity building and long-term investment in innovation. Education and training systems should better align with the demand for skilled labour and interdisciplinary talent. Furthermore, collaborative mechanisms across the entire industrial chain should be refined, enabling design institutes, contractors, manufacturers, technology companies and operational entities to work within a more integrated value network.

Only when technological upgrading, organisational reform, policy coordination and human capital development advance in tandem can the economic benefits of the construction industry's transformation be sustained and amplified [12].

## 5. Conclusion

This study examines the economic effects and driving mechanisms of the transformation and upgrading of the construction industry under the new development paradigm. The results indicate that the transformation and upgrading of the construction industry can significantly enhance resource allocation efficiency, stimulate technological innovation, optimise the employment structure, strengthen industrial linkages, and promote green and low-carbon development. Policy guidance, technological progress and market pressures act in concert to form the core driving force, with the driving role of policy and technological factors being particularly prominent.

The economic effects of transformation and upgrading are not only reflected in the industry's own efficiency gains but also generate positive spillover effects through industrial linkages, thereby enhancing macroeconomic resilience and sustainability. At the same time, factors such as disparities in corporate capabilities, insufficient integration of technology and management, and imperfect market coordination mechanisms continue to constrain the full realisation of these economic effects.

The marginal contribution of this paper lies in clarifying the transmission channels through which the transformation of the construction industry influences economic development, and in confirming the supportive role of integrated upgrading in high-quality development. The study recommends that, in the future, policy coordination should be strengthened, the deep integration of digitalisation and greening should be accelerated, and industrial chain coordination mechanisms should be improved to drive the construction industry's shift from scale expansion to quality- and efficiency-oriented development.

As this study is based solely on national-level time-series data, future research could explore regional heterogeneity, inter-firm differences and comparisons across sub-sectors to reveal the economic impacts of the construction industry's transformation and upgrading with greater precision.

## References


[1] Osei, K. K., &Jin, X. (2022). Digital transformation and economic performance in the construction industry: A systematic review. Sustainability, 14(11), 6821.

[2] Liu, Y., & Chen, W. (2021). High-quality development and industrial restructuring in China’s new development stage. Journal of Asian Economics, 74, 101385.

[3] Porter, M. E. The Competitive Advantage of Nations. New York: Free Press, 1990.

[4] Wang, H., & Zhang, L. (2023). Policy-driven green transition in construction: Impacts and mechanisms. Building and Environment, 231, 109976.

[5] Brynjolfsson, E., and McAfee, A. The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. New York: W. W. Norton & Company, 2014.

[6] Li, S., et al. (2022). Cost pressure, technological choice and upgrading in construction. Construction Innovation, 22(3), 895–918.

[7] Zhang, Q., & Wang, Y. (2020). High-quality development theory and its implications for China’s construction sector. Urban Policy and Research, 38(4), 412–428.

[8] Chen, J., et al. (2023). Productivity growth and resource allocation in the construction industry. Journal of Construction Engineering and Management, 149(5), 04023027.

[9] Pan, W., & Ning, Y. (2022). Industrial linkages and spillover effects of the construction sector. Sustainable Development, 30(2), 356–369.

[10] Schumpeter, J. A. Capitalism, Socialism and Democracy. New York: Harper & Brothers, 1942.

[11] Glaeser, E. L. Triumph of the City. New York: Penguin Press, 2011.

[12] Zhao, Y., et al. (2021). Barriers and pathways to integrated upgrading in the construction sector. Journal of Cleaner Production, 310, 127566.