Research on Optimization of Residential Project Operation Management Strategy of Real Estate Enterprises Under the Background of Digital Economy

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Abstract: In the digital economy era, the real estate industry faces transformation challenges, and the new generation of information technology supports it. This paper analyzes the policy, economic, technical, social, and cultural environment of real estate enterprises' residential project operation and management. It points out that the industry's overall digital investment is low and there are problems such as "system islands". At present, the digitalization of the operation and management of real estate companies is transforming, but there are systemic bottlenecks such as disconnection between strategic planning and execution, difficulties in industrial ecology coordination, failure of customer insights, and pressure on operational efficiency and financial indicators. To optimize transformation, enterprises should include digital transformation into the strategic core, build a digital platform for the full value chain, apply emerging technologies, and build a diversified talent team; in terms of product innovation, they should deeply integrate green environmental protection and intelligent technologies, enhance community cohesion, implement full life cycle management, improve customer feedback mechanisms, and provide customized products. In the future, the digital transformation of the real estate industry will be deepened, and intelligence, greenness, and humanization will become mainstream.

1 INTRODUCTION

In the current digital economy era, a new generation of information technology with big data, artificial intelligence, and cloud computing as the core is deeply reconstructing the structure of traditional industries. As an important part of the national economy, the real estate industry is facing dual transformation challenges driven by changes in the external environment and the demand for internal efficiency improvement.

Under the policy orientation of "housing for living, not for speculation", measures such as the "two concentration" policy of land supply and the "three red lines" of financing supervision have prompted real estate companies to shift from disorderly expansion to quality-oriented operation models. According to data from the Ministry of Natural Resources, the national construction land transaction volume in 2022 decreased by 19.4% year-on-year, and the scarcity of land resources in core cities has been further highlighted, forcing enterprises to improve land use efficiency. At the same time, with the change in consumer groups, the demand for digital services such as smart communities and green buildings is growing.

Under the combined effect of the above multiple factors, the transformation of the real estate industry is imminent, and at this time, the technological revolution represented by the new generation of information technology has just provided strong support for the transformation of the industry. Emerging technologies such as BIM technology, VR house viewing, and smart property platforms are more efficiently assisting real estate development at different stages. However, the industry's overall digital investment only accounts for 0.75% of its revenue, and there are typical problems such as "system islands" and "data barriers". It is enough to show that there is a huge gap between traditional models and digital demands.

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2 ANALYSIS OF THE OPERATION AND MANAGEMENT ENVIRONMENT OF REAL ESTATE ENTERPRISES IN THE BACKGROUND OF THE DIGITAL ECONOMY

2.1 Policy Environment Analysis

National policies continue to make efforts to continuously promote the real estate industry to seek new development paths in standardization, from financing management to industrial upgrading guidance, which has shaped the policy environment for real estate enterprises' residential project operation and management in all aspects. For example, the "Three Red Lines" policy strictly limits the financing scale and channels of real estate companies, effectively curbing the risk of excessive financialization in the real estate industry. The "14th Five-Year Plan" Digital Economy Development Plan proposes to build a modern industrial system, while the Ministry of Housing and Urban-Rural Development focuses on promoting intelligent construction and construction industrialization. At the same time, the policy positioning of "housing for living, not for speculation" further emphasizes the living attributes of real estate and guides the market to return to rationality. In addition, local policies in various places have also actively responded to the national call. For example, Changsha City has stabilized the real estate market through measures such as pre-sale fund supervision and talent settlement discounts and put forward higher requirements for the stable operation capabilities of real estate companies. Under the profound influence of the policy environment, the economic environment of real estate enterprises' residential project operation and management also shows corresponding characteristics (Li, 2022).

2.2 Economic Environment Analysis

Due to the influence of multiple factors, the current real estate market is showing a downward trend overall. The growth rate of national real estate development investment has slowed down, and both commercial housing sales and sales areas have dropped significantly. In 2024, the sales area of newly built commercial housing was 973.85 million square meters, a decrease of 12.9% over the previous year, of which the sales area of residential housing decreased by 14.1%. Sales of newly built commercial housing were 9675 billion yuan, down 17.1%, of which residential sales fell 17.6%. All real estate companies are facing challenges such as sales difficulties, extended repayment cycles, and tight capital chains. In 2024, real estate development companies had 107661 billion yuan of funds, a decrease of 17.0% over the previous year. Among them, domestic loans were 1521.7 billion yuan, down 6.1%; foreign capital utilization was 3.2 billion yuan, down 26.7%; self-raised funds were 3774.6 billion yuan, down 11.6%; deposits and prepayments were 335.71 billion yuan, down 23.0%; personal mortgage loans were 156.61 billion yuan, down 27.9%. At the same time, with the tightening of financial policies, the financing costs of real estate companies continue to rise, and financing channels are further restricted. This undoubtedly increases the operating pressure of real estate companies (Zhu, 2023).

2.3 Technical Environment Analysis

In the macro context of today's digital economy era, the continuous innovation of technology has brought new development opportunities to the real estate industry. The widely used technologies, such as big data, cloud computing, and the Internet of Things, are reshaping the full life cycle management of residential projects. For example, smart construction site solutions effectively improve the safety and work efficiency of the construction site through remote monitoring and visual management; BIM technology realizes digital collaboration between project design and construction management, significantly improving project quality and construction efficiency. In addition, the application of emerging technologies such as VR house viewing and online sales departments has greatly subverted the traditional real estate sales model to a certain extent and improved customer experience (Hang, 2022).

2.4 Social and Cultural Environment Analysis

With the progress of society and the transformation of consumer concepts, housing has changed from a simple living space to a symbol of people's yearning for a better life. Green and environmental protection and intelligence have become new trends in residential projects, which also reflect consumers' increasingly high demands for housing quality and services. At the same time, changes in population structure, such as the increasing aging and low birth

rate trend, have also had a great impact on the real estate market directly or indirectly, allowing the product structure and market strategies of real estate companies to be continuously adjusted (Hua, 2023).

3 ANALYSIS OF THE CURRENT SITUATION AND PROBLEMS OF RESIDENTIAL PROJECTS IN REAL ESTATE ENTERPRISES

3.1 Current Status of Operation and Management

In my country's real estate industry, digital practices related to residential project operation and management are transforming proof of concept into initial implementation. Under the dual effects of policy orientation and market pressure, the importance of improving the efficiency of full-cycle management has been widely recognized in the industry. Leading enterprises such as Vanke and Country Garden took the lead in making arrangements, using the BIM collaborative platform to achieve the integration of data in the entire chain of design, construction, operation, and maintenance, and the engineering change phenomenon has been reduced by 15%-20%, which has been shortened by more than 10%. Examples show that AI customer profile technology combined with big data analysis has increased the marketing conversion effect by 25%-30%.

The overall development trend of the industry is characterized by "local prominent but insufficient coordination". Data disclosed in CRIC's "2023 Real Estate Digital Development White Paper" shows that about 78% of enterprises' digital applications are only concentrated in a single business module, and the independent operation of financial systems, marketing systems, or procurement systems is relatively common. Only 12% of the companies build a digital platform for the entire value chain. Most of these are leading real estate companies, covering all aspects from investment decisions to property management. This shows that there are obvious flaws in data asset accumulation: the complete rate of the industry's core business data is generally less than 65%, and the quality of customer behavior data, project progress data, and cost dynamic data is uneven. Under the current situation where the industry data specification coverage rate is less than 40%, there are significant differences in data definition, format, and update frequency between different systems. A case of a TOP20 real estate company shows that there is more than 30% logical inconsistency between the customer labels of its marketing system and the service records of the property system, and the efficiency of customer value mining has decreased by 40%.

It is worth noting that the application depth of digital tools shows a clear differentiation. Some leading enterprises have introduced the entire process of digital twin technology simulation project development. After realizing the optimization of the solution through virtual construction, the actual construction cost will be reduced by 8%-12%. Small and medium-sized real estate companies that still rely on traditional ERP systems mainly realize the online function of basic business processes, and their ability to deeply explore data value is insufficient. The deep differentiation of the application of this digital tool has also laid the groundwork for subsequent issues in strategic planning implementation, industrial ecological coordination, etc. Relevant data in 2022 show that while the inventory turnover rate of leading real estate companies is 1.2 times higher than the industry average, the phenomenon that the average sales cycle of small and medium-sized real estate companies has been extended from 18 months to 24 months confirms the trend of intensifying resource mismatch (Liu, 2023; Sun, 2021).

3.2 Problem Analysis

In the process of advancing the digitalization process of residential project operation and management, although phased results have been achieved by some real estate companies, systemic bottlenecks still pose severe challenges.

The first thing that shows is the disconnection between strategic planning and implementation. The latest survey data of the China Real Estate Association shows that 63% of corporate entities have failed to formulate digital special planning plans for more than three years. This disconnection between strategic planning and execution further affects the capabilities of real estate companies in industrial ecological coordination, thus causing a series of chain problems. The cognitive bias of simplicity of digitization with "IT system procurement behavior" is common among management groups, and the collaborative design elements related to return on investment calculation and organizational structure change have been significantly ignored. Examples show a case of a top 100 real estate development

company: the company invested more than 50 million yuan in the construction of smart management platforms, but the traditional assessment mechanism with offline sales indicators as the core has not been adjusted simultaneously. The willingness of front-line business personnel to use continues to be sluggish, and the system activity indicators quickly declined to 32% in a three-month cycle. At the same time, it is worth noting that temporary capital investment methods are adopted by more than 60% of enterprises (Li, 2020). The technology iteration speed is 2-3 years lag compared to market demand, thus forming a non-virtual cycle state where high investment and slow effect coexist.

The barrier to industrial ecological coordination has aggravated the dilemma of transformation. The characteristics of the real estate industry are long, and the participants are scattered, which shows a sharp contradiction with the real-time digital coordination needs. Data monitored by the Ministry of Housing and Urban-Rural Development shows that the interface between real estate companies and design, construction, and suppliers does not exceed 30%. Key nodes within the business, such as material acceptance or project visa, still need to rely on manual filling, resulting in an error rate of information transmission as high as 18%. Compared with the manufacturing industry, the continuous response efficiency of real estate supply is more than 40%, and the design change cycle takes up to 7 days, while the manufacturing industry can be closed within 24 hours.

If the customer insight mechanism fails, it can be seen that the risk of disconnection in the product market has increased sharply. Under the traditional market regulation method, it is difficult to quickly capture the demand for iteration. Beike Research Institute revealed that the accuracy of identifying customer demand is only 58%, and the conclusion is lagging behind market changes by 3-6 months. A certain improved residential project designed the apartment with data half a year ago, but after the opening, it was found that the demand for smart homes increased by 47%, and it had to be rebuilt in the middle, increasing to 1,200 yuan/square meter in cost. However, if customer data assets are divided between sales and property sectors, the whole domain ID is blocked, which hinders the establishment of a 360° customer view, and precise marketing and innovation successively lose the required data support (Zhu, 2023).

Ultimately, the dual pressure on operational efficiency financial indicators reflects the rise of a system crisis with lagging transformation. Data in the first half of 2023 showed that the industry's average inventory turnover period has been extended to November, the capital turnover rate decreased by 12% to 15% year-on-year, and financial expenses gradually increased to about 8.2% of sales. For example, a second-tier city development case was delayed for delivery for 9 months due to failed process monitoring, which triggered rights protection, resulting in the cost of restoring the brand accounting for 21% of the net profit. However, the lack of data governance has greatly reduced the accuracy of dynamic income estimation. This pain points together form a negative cycle of "fuzzy strategy - split ecology - wrong judgment of demand - efficiency recession", revealing the profound pain of real estate transformation from "scale-driven" to "digital media-driven".

4 EXPLORATION OF OPTIMIZATION PATHS

4.1 Digital Transformation Strategy

At the current stage, the real estate industry is increasingly in need of digital transformation. The digital transformation of real estate enterprises is a systematic project. The formulation and implementation of systematic strategies urgently need to be paid attention to by enterprises. By gradually advancing specific implementation steps, can effectively promote the transformation process.

First, digital transformation work will be included in the core scope of corporate strategy. Real estate companies need to clarify the establishment of transformation vision, setting goals, and planning of implementation paths to ensure that directional choices maintain a high degree of consistency between the company's long-term development goals (Zhang, 2023; Wang, 2025). In addition, a special digital transformation leading group or committee can be established, and the agency is responsible for coordinating resources to ensure the orderly progress of transformation work.

The construction of a digital platform is the cornerstone of the digital transformation of real estate companies and the key support for achieving corporate strategic goals. The key breakthrough lies in the construction of digital platforms that need to cover the entire value chain. The key to eliminating data silos and realizing the goal of data interconnection depends on this. Core businesses such as financial modules, marketing modules, design

modules, construction modules, and property modules should be fully integrated by real estate companies. Establish unified data standards and interface specifications to ensure the smooth flow of data between departments; the use of big data analysis technology makes it more possible to mine data value, thereby significantly improving decision support; the continuous optimization of marketing strategies has been carried out, and the trend of improving customer experience satisfaction indicators and loyalty coefficients is visible.

The application of technological innovation is the core driving force for the digital transformation of real estate companies and the key to promoting the efficient operation of digital platforms and improving the operational efficiency of enterprises. Innovative applications at the technical level are the core driving force in the digital transformation process. What is worth paying attention to are emerging technologies such as big data analysis technology, cloud computing systems, Internet of Things equipment, and BIM modeling tools, and it is also the blue ocean that real estate developers have focused on. The promotion and application of intelligent construction solutions and the construction site intelligent management system have become an important practical direction at the current stage (Feng, 2023). Relying on BIM technology, the digital collaboration between the project design links and the construction management process has greatly improved construction efficiency, and the project quality level has also improved significantly. The deployment of remote monitoring systems for equipment with the help of IoT technology and the implementation of intelligent operation and maintenance methods has also greatly reduced the operation and maintenance costs.

The construction of a talent team is an important guarantee for the digital transformation of real estate enterprises and a key support for ensuring the smooth implementation of various digital measures. The construction of the talent team should show diversified characteristics. By adopting a model that combines internal training mechanisms and external recruitment channels, will strengthen the cultivation and introduction of digital talents, and build a compound talent echelon that is proficient in real estate business processes and masters information technology means. At the same time, establishing an incentive mechanism to mobilize employees' enthusiasm for participation requires a transformation mechanism to gradually form a transformation atmosphere for all employees to participate (Wen, 2023).

4.2 Product Innovation Strategy

Against the backdrop of increasingly fierce competition in the industry and the continuous upgrading of consumers' needs, product innovation strategies have become the key to real estate companies achieving sustainable development and enhancing their core competitiveness. The innovation of real estate companies covers the entire process from product design, and construction, to operation, which requires in-depth integration and coordinated promotion of various factors. Specifically, the integrated application of green environmental protection concepts with intelligent technology, the community construction combining online and offline, the implementation of full life cycle management, and the improvement of customer feedback mechanisms together constitute the core framework of real estate companies' product innovation strategies. These aspects are interconnected and promote each other, and jointly create high-quality, personalized, and meet market demand residential products, thereby improving customer satisfaction and brand reputation.

In the field of product innovation strategies, the entire process of product design, construction, and operation of real estate companies can be deeply integrated with green environmental protection concepts and intelligent technologies (Zhang, 2021). Actively respond to the call of the national green building policy, attach importance to the use of environmentally friendly materials and the promotion of energy-saving technologies, and create green ecological residential buildings. What cannot be ignored is the integration of smart home systems. When the interconnection and intelligent control functions between home devices are achieved, the convenience and comfort of living will be visually improved.

The combination of online and offline methods helps to enhance community cohesion and improve residents' sense of happiness. The application of IoT technology has made the intelligent monitoring and operation, and maintenance of community facilities a reality, and the improvement of the community management level is obvious. The development of community cultural activities has a significant effect on the enrichment of residents' spiritual and cultural life. In addition, in terms of community service innovation, the construction of a smart community platform is one of the important directions for real estate companies. The integration of property, commerce, education, medical care, and other

resources needs to be completed, and the provision of one-stop community services is achieved.

The implementation of full life cycle management is crucial to ensuring the quality of residential products. The use of digital means can achieve real-time monitoring and adjustment of project progress, thereby strictly implementing the entire process management from the project planning stage to design, construction, and then to delivery and operation, and achieving the purpose of on-time delivery.

The establishment of a customer feedback mechanism and the improvement of the complaint-handling process need to be promoted simultaneously, and a timely response to customer needs cannot be ignored. In this way, real estate companies can continuously optimize their products and services, which shows the improvement in customer satisfaction and brand reputation. In addition, big data technology can be used to analyze customer preferences and needs and to explore potential customers who provide customized residential products. For example, product options such as modular design and fine decoration house options can increase product flexibility and selection space (Xie, 2021).

5 CONCLUSIONS

In the current digital economy era, the real estate industry is undergoing profound changes. The comprehensive implementation of digital transformation strategies and the systematic promotion of product innovation strategies enable all enterprises to effectively respond to changes in the external environment and improve internal efficiency. Through digital transformation, significant improvement in operational efficiency and continuous strengthening of corporate competitiveness can be achieved; consumers' demands for high-quality residential and smart communities can also be fully responded to. With the continuous advancement of technological progress and the continuous improvement of market maturity, the digital transformation of the real estate industry will show a deepening trend in the future, and the direction of intelligence, greenness, and humanization has thus become the mainstream of industry development.

Real estate companies should actively embrace change and give themselves the core strategic position of the digital transformation process. Strategic integration, innovation in technology fields, optimization and adjustment of organizational structure, and redesign of business processes, these measures jointly promote the overall digitalization process of the enterprise. The product innovation link cannot be ignored. The integration of green environmental protection concepts, strengthening of intelligent features, and injecting customized and personalized elements have enabled products and services to improve market competitiveness. The continuous improvement of customer satisfaction and the steady accumulation of brand reputation have been achieved through the improvement of the full life cycle management mechanism the normalization of optimization measures, and the Sustainable Development Goals have been achieved.

In the face of many challenges, the continuous tracking of industry trends cannot be ignored by enterprises, and forward-looking analysis of technological development trends is equally important. The timeliness of strategy optimization and adjustment reflects the level of the company's response capabilities, and the depth of industrial chain integration determines the quality of transformation results. It can be seen that the acceleration of the digitalization process cannot be separated from the collaborative participation of multiple parties, and the improvement of living quality depends on the dual role of technological innovation and management optimization.

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