Textual Analysis of China's Assembly Building Policy from the Perspective of Policy Tools

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Abstract. To clarify the overall vein, governance intention and focus point of the assembly building promotion policies, this paper adopts the content analysis method to conduct an in-depth study of the assembly building promotion policies in 32 regions of China from the dimensions of policy external structure, effectiveness level and policy tools. The study found that the number of policy releases is affected by regional economic development level, industrial foundation and other factors, showing significant regional differences. There is a structural imbalance in the distribution of policy instruments. In addition, there are structural deficiencies in the policy system, which is "macro-heavy and micro-heavy," and there is a relative lack of specialized policies. Based on this, this paper proposes the implementation of differentiated policies based on the gradient of regional economic development, and the construction of a "1+N" policy system, while establishing a dynamic evaluation mechanism. It provides theoretical support and path suggestions for the optimization of China's assembly building promotion policy.

Keywords: Assembly building; Policy tools; Content analysis

1   Introduction

Facing the complex international environment and domestic challenges, assembly building has become the main direction of China's construction industry to vigorously develop with its advantages of fast construction speed, controllable quality, energy saving and environmental protection, and high flexibility [1]. Since the state issued the policy of "the General Office of the State Council on vigorously developing the guidance of assembly building", each region has also issued a series of policies to promote the development of assembly building industry. The relevant policy documents have been counted over 1026. However, the current comprehensive combing and multi-perspective analysis of China's assembly building policy is still insufficient, although the existing research has quantitatively analyzed the policy subject, policy effectiveness and policy tools of assembly building, and explored the changes in the assembly building promotion policy [2], but the exploration of external characteristics such as the policy release time, policy distribution region, and type of policy has not yet

been perfected, and the overall understanding of the policy direction is still relatively scarce, making it difficult to provide the best policy for the development of assembly building industry, understanding is still relatively scarce, and it is difficult to provide a strong basis for further improvement and optimization of the policy. In view of this, based on the perspective of policy tools, this paper conducts an in-depth analysis of the assembly building-related policy texts issued by Chinese provinces and cities in the past 10 years (2014-2024) through the content analysis method, and explores in detail the current status of the development of China's assembly building through the three dimensions of the external structure of the policy, the policy effectiveness hierarchy and the policy tools, with the aim of providing a scientific basis and references for the further optimization of China's assembly building policy. It aims to provide scientific basis and reference for the further optimization of China's assembly building policy.

2   Research Design

2.1   Research Methodology Development

Based on the perspective of policy tools[3], this paper conducts an in-depth analysis of the assembly building-related policy texts issued by provinces and cities in China in the past ten years (2014-2024) by means of the content analysis method, and explores in detail the development status of China's assembly building in the three dimensions of the external structure of the policy, the level of the policy effectiveness, and the policy tools, with the aim of providing a scientific basis and a reference to further optimize China's assembly building policy. This method has been widely applied in the fields of building energy efficiency[4],green building development[5],resource-based treatment of construction waste[6],building information modeling[7],etc. It helps to grasp the basic features of the whole policy system, excavate the links and differences between policy texts, identify the weak links in the process of related policy formulation, and provide reference for optimizing the subsequent policy design.

2.2   Sources of Research Data

This paper takes the websites of the relevant departments of the General Office of the People's Government of each province, autonomous region and municipality directly under the Central Government of China as the data source, and searches with the keyword "assembly" to obtain a total of 1,026 relevant documents. By reading through the full text of the 1,026 documents to identify them, a portion of the policy documents of low relevance were excluded, and finally 246 relevant policy documents that met the requirements were collated.

2.3   Research Framework Construction

This paper constructs an analytical framework containing three dimensions of policy external structure, policy effectiveness level and policy tools [8], to analyze the overall

characteristics of the policy text of local government assembly building market construction at the provincial level in China, as shown in **Fig. 1**.
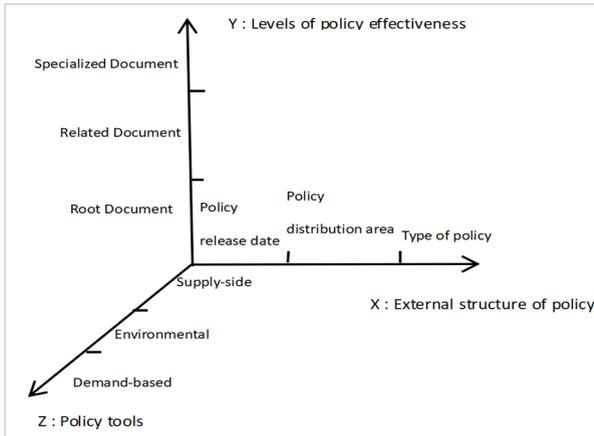

Fig. 1 Three-dimensional framework analysis diagram

(1) Policy External Structure Dimension: the X Dimension

First, from the perspective of policy release time, we statistically analyze and describe the evolutionary trend of the number of local government assembly building promotion policies and their stage characteristics in China. Second, from the perspective of policy release regions, the number of policy releases in the seven regions of Northeast, North, Central, East, South, Northwest and Southwest China are compared horizontally to examine the different characteristics of policy supply among regions. Finally, from the perspective of policy types, it reveals the focus of local governments' policy concerns and their degree of importance in the process of assembly building development, providing a quantitative basis for evaluating the effect of policy implementation. This multi-dimensional and systematic quantitative analysis method helps to comprehensively grasp the external characteristics of China's government data factor market construction policy and its spatial distribution law [9].

(2) Policy Effectiveness Hierarchy Dimension: the Y Dimension

This paper categorizes China's assembly construction-related policies into root documents, related documents and specialized documents according different levels of policy effectiveness. Root documents refer to macro-level policies with foresight and guidance based on the goals, concepts and strategies of the overall development of each region. Related documents are the middle level policies that guide and direct the development of the construction industry based on the macro-level policies. Specialized documents are micro-level executive policies, implementation opinions, standards and guidelines for specific measures for high-quality development of the construction industry, etc., which are key policies that determine whether the expected goals of the root policies and related policies can be realized.

(3) Policy instrument dimension: the Z dimension

Policy instruments are the means to achieve policy objectives and are an important bridge between the design of policy objectives and the effects of their implementation, and are classified into three types: supply-type instruments, environment-type instruments and demand-type instruments [10]. Based on this analytical framework. As show in **Table 1**, this paper subdivided the three types of policy instruments into 14 specific types of policy instrument implementation. From the perspective of international practice, China's assembly promotion policy is even more unique. Compared with the industry self-organization mode promoted by Germany through the Sustainable Building Council certification system, or the market access regulation implemented by Singapore through the Building Productivity Scoring System, China has creatively embedded the political mobilization mechanism into the technology diffusion process through the double-wheel drive of "political potential + industrial synergy", so that the proportion of assembled buildings has jumped from 3% in 2015 to 25% in 2022, with a growth rate exceeding the growth rate of 25% in 2022. Through the drive of "political potential + industrial synergy", the proportion of assembled buildings has jumped from 3% in 2015 to 25% in 2022, with a growth rate exceeding that of developed countries by a factor of 3 over the same period.

Table 1. Type of Implementation of Policy Instruments

Broad Categories of Policy Tools	Type of Policy Tool Implementation
Supply type	Strengthening industry talent; Increasing financial support; Enhancing land security; Promoting green development; Transportation support
Environmental	Standardize a sound system; Strengthen supervision and management; Market-led; Strengthen publicity
Demand-based	Promote in zones; Government guidance; International cooperation; Healthy competition among enterprises; Market demand

3   Findings and Analysis

(1) Policy release time and subject

The study found that the current release of China's assembly building policy presents significant characteristics in the main dimension and spatial distribution: in the main dimension, the number of policy releases from the provincial people's government offices occupies an absolutely dominant position; in the time dimension, since the issuance of the "Guiding Opinions of the State Council's General Office on Vigorously Developing Assembly Buildings" by the State Council's General Office on October 8, 2016, the assembly building development policy have been rapidly rolled out at the local government level and concentrated on the issuance of a large number of policy documents in 2016-2017, reflecting the rapid response mechanism of local governments to national policies, and presenting the typical "core-edge" diffusion characteristics.

(2) District in which The Policy was Issued

From the perspective of policy release regions, the regional distribution of policy texts on local government construction in China shows significant unbalanced characteristics. Linear regression analysis based on the number of policy texts shows that East China leads with 11 policy texts, followed by North China (7), Southwest China (5), Northwest China (5), South China (4), Northeast China (3) and Central China (3). The formation mechanism of such regional differences can be attributed to the synergistic effect of multi-dimensional influencing factors: first, the level of regional economic development and the degree of application of digital technology are the basic supporting elements. Statistical data show that the core area of the Yangtze River Delta (Shanghai, Jiangsu) in 2022, the scale of the digital economy accounted for 45.6% of the proportion of GDP, significantly higher than the national average (39.8%), the policy text is not only leading in the number of policies, but also in the intelligent construction technology standards, BIM application specifications, and other cutting-edge areas of the formation of a complete policy system. Second, the effectiveness of institutional innovation and the iterative ability of policies play an important driving role. Beijing, as the first policy demonstration area, through the "guidance on vigorously developing assembly building" of the early and pilot, its policy diffusion effect led to the formation of cluster development in North China. Finally, the stage of urban development and industrial infrastructure conditions form differentiated constraints. Central China is limited by the assembly building components production base is insufficient, the policy focus on the industry chain strengthening link; in contrast, East China relies on 15 national assembly building industry base, the policy focus has shifted to the whole life cycle management and low-carbon development.

(3) Types of Policies Issued

In terms of the types of policy issuance (Fig. 2), the distribution of existing document types is extremely unbalanced, with guiding opinions dominating, accounting for 83.78%, and administrative circulars, regulations, and implementation rules dominating, accounting for 10.81%, 2.70%, and 2.70%, respectively. This unbalanced distribution pattern reflects that local governments are more inclined to adopt flexible means of governance in the early stage of promoting the new type of industrialization of construction. And compared with the mandatory constraint approach and institutional policy tools, opinion-based administrative norms show significant responsive governance advantages due to their institutional flexibility and dynamic adaptability. This essentially reflects the strategic choice of local governments in institutional innovation: to reduce the cost of policy friction through flexible governance tools, while reserving experimental space for subsequent policy iterations.

(4) Effectiveness of The Policy

Based on the policy text analysis framework, this study divides the policy system into three levels: root documents, related documents and special documents through text mining and classification coding of assembly building-related policies issued by provincial governments. The empirical study shows that the current policy structure is characterized by an obvious imbalance: root and special policies account for 12.3% and 18.7%, respectively, while related policies account for 69.0%. This structural imbalance reflects the following institutional dilemmas in China's housing policy system. Scarcity of root policies leads to insufficient supply of top-level design, making it

difficult to form a complete institutional framework, reflecting a systematic lack of policy hierarchy. The low proportion of specific policies reflects a poor match between policy instruments and industrial demand. Existing policies mostly focus on the macro-guidance level, and there is a lack of specialized policy support in key areas such as key technical standards (e.g., BIM and assembly co-design), industry chain synergy (e.g., prefabricated component logistics system), and quality traceability. This policy orientation of "focusing on the macro and not on the micro" has led to market players facing the implementation dilemma of "having directions but no solutions". While the high proportion of linked policies (>65%) reflects the breadth of policy dissemination, there is also a risk of "policy drift". The study shows that 42.3% of linked policies issued by provincial governments are repetitive and 31.7% lack substantive innovation, suggesting a structural loss of policy effectiveness. This "policy bubble" phenomenon not only results in a waste of administrative resources, but also weakens the authority of policies and leads to a "policy fatigue" effect.

(5) Policy Instrument Type Code

1) Open Codes. Open coding is a flexible and highly extensible coding approach [11] that allows arbitrary symbols or information to be mapped to a specific coding sequence through coding, without being restricted to predefined symbols or coding lists, and is a foundational stage of rooted theory. In **Table 2**, by deconstructing and regrouping the content of the policy texts from the collected 246 policies related to assembly construction, the content was organized, conceptualized, categorized and re-coded . Eighty-seven concepts and 14 categories were obtained.

Table 2. Conceptualizing The Open Coding of Building Policy Texts

No.	Concept	No.	Concept	No.	Concept
a001	Market-led	a020	Pursue general contracting	a103	Increase financial support
a002	Improve specification system	a021	Strengthen social promotion	a104	Strengthen land security
......	......	......	......	......	......
a018	Improve industrial chain	a101	Strengthen talent training	a121	Strengthen technical guidance
a019	Strengthen performance evaluation	a102	Increase capital investment	a122	Increase financial support

2) Spindle Type Coding

Principal axis coding is a type of coding in rooted theory. The main purpose is to discover and establish various organic links between the main conceptual categories and the secondary conceptual categories, so as to reorganize the scattered information in a new way. Through the spindle coding, in **Table 3**, a total of "Standardizing the sound system", "Strengthening supervision and management", "Market-driven", "Enhanced advocacy", "Zoning promotion", "Government guidance", "International cooperation", "Healthy competition among enterprises", "Market demand", "Strengthening supervision and management" and "Market demand". "Strengthening industrial talents", "Increasing financial support", "Strengthening land security", "Promoting green development", "Transport support"14 categories.

Table 3. Summary of Selected Policy Texts

No.	Subcategory	Concept	No.	Subcategory	Concept
1	B01 Standardizing the sound system	a001, a002, a003, a005, a008, a009, a013, a016, a018	8	B08 Healthy competition among enterprises	a039, a042, a043
2	B02 Strengthening supervision and management	a004, a006, a007, a010, a011, a014, a015, a017, a019	9	B09 Market demand	a034, a035, a037
3	B03 Market-driven	a000, a012	10	B10 Strengthening supervision and management	a100, a101, a108, a110, a117, a121
4	B04 Enhanced advocacy	a021, a022	11	B11 Increasing financial support	a102, a103, a107, a109, a112, a113, a120
5	B05 Zoning promotion	a030, a031, a038	12	B12 Strengthening land security	a104, a106, a119
6	B06 Government guidance	a031, a040, a041	13	B13 Promoting green development	a105, a111, a114, a115
7	B07 International cooperation	a033, a036	14	B14 Transport support	a116, a118

3) Theoretical Saturation Test

Theory saturation is the process of testing the reliability and validity of spindle coding. For the results coded by 3 coders from 3 aspects of supply-based policy, environment-based policy and demand-based policy, 20 nodes were selected from each category, and the results of the agreement rate test were 0.83, 0.82 and 0.85. The criteria for the reliability test were met.

The results show in **Fig. 2** that supply-oriented, environment-oriented and demand-oriented policies account for 37.3%, 39.0% and 23.7% respectively, showing the typical characteristics of being mainly environment-oriented, with relatively small numbers of supply-side and demand-based policies. Among them, the environmental policies are mainly "standardizing and improving the system" and "strengthening supervision and management", accounting for 39.13%, while "market-oriented" and "strengthening publicity" account for 39.13% and "market-oriented" and "strengthening publicity" account for 23.7%. "The share of 'strengthening publicity' is even lower, at 10.87%. Among the supply-side policies, "strengthening financial support" and "strengthening industrial talents" take a larger share, accounting for 36.36% and 40.91% respectively. Comparatively, among the demand-oriented policies, the number of policies is even: "Strengthening industrial talents", "Increasing financial support", "Strengthening land security", "Promoting green development", "Supporting transportation" and other 14 categories.
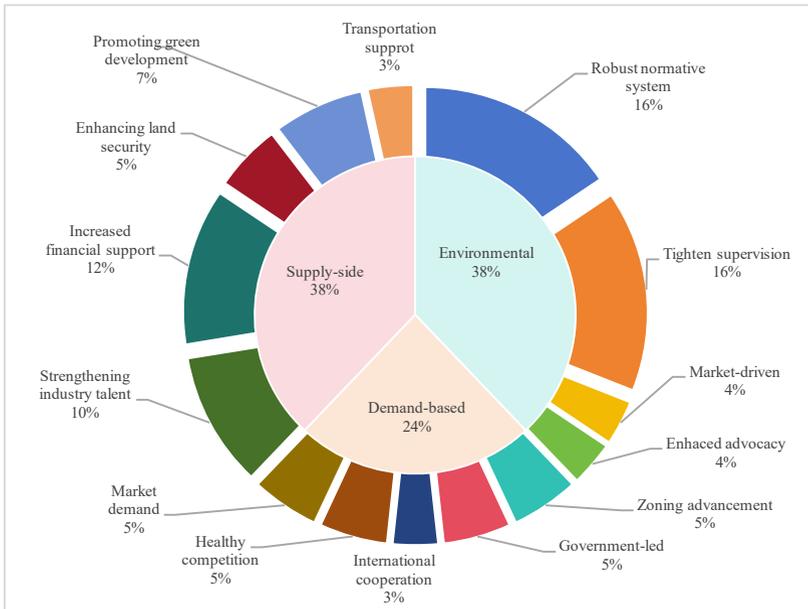
Fig. 2 Statistical map of the percentage distribution of policy instruments

4 Conclusion and Suggestion

Based on the content analysis method, this paper conducts an in-depth study of assembly building related policies in 32 regions of China through the three dimensions of policy external structure, policy effectiveness level and policy tools. The research findings are presented:

At present, China's policy to promote assembly construction has unbalanced characteristics in the type of policy instruments. Specifically, the structural imbalance of policy tools is as follows: supply-based policy (45.6%), environmental policy (38.2%), while demand-based policy is obviously insufficient (only 16.2%). This "supply-heavy, demand-light" model of allocation of policy instruments may lead to confusion of policy signals, lower efficiency of instruments and conflict with policy objectives. It is recommended to optimized the combination of policy tools, establish a dynamic balancing mechanism of supply, environmental and demand policies, and form a "three-in-one" policy support system. On the supply side, establish a dedicated development fund for prefabricated buildings and ensure that R&D investment is no less than 3% of industry turnover. It will implement the 'commander's list' system, focusing on breakthroughs in modular connectivity, digital design and other key technologies. At the same time, a national library of demonstration projects will be established to create a replicable technology application paradigm. Strengthen the construction of the environmental standard system, including the formulation and improvement of technical standards and quality supervision systems for prefabricated buildings, to provide

solid institutional safeguards for the development of the industry. This includes formulating a BIM technology standard system covering the whole process of design, production and construction. Establishing a quality traceability blockchain platform, to achieve full lifecycle supervision of components. And improving the certification and evaluation system, and incorporating the assembly rate requirement into the green building evaluation standard. Focus on expanding public procurement on the demand side by including prefabricated buildings in the mandatory procurement list for public investment projects. Innovating incentive policies such as volume rebates and tax credits, as well as establishing an incentive mechanism for industrialised construction based on carbon emissions trading.

China's assembly construction-related policies in different regions in the number of releases also shows a non-equilibrium character. The policy density index is 1.23 in East China, 1.15 in North China, and only 0.87, 0.76 and 0.81 in South, Northeast and Central China respectively, with obvious regional aggregation characteristics. The unbalanced spatial distribution of policies may lead to differences in the effectiveness of policy governance and participation, resulting in low governance effectiveness. It is recommended to implement the "regional coordinated development plan": set up demonstration zones for the assembly industry in weak policy areas, promote policy innovation and localization adaptation through practice, and actively explore incentive mechanisms; support special transfer payments and support weak policy areas to overcome development bottlenecks through differentiated fund allocation; through the "enclave economy" mode, introduce industrial resources from developed areas to attract more enterprises to move in and form the aggregation effect.

There are systematic flaws in the policy hierarchy of China's policies related to assembly construction. Related policies account for 67.8%, while specialized policies account for only 18.3%, reflecting the structural problem of "macro-focus, micro-light" in the policy system. This phenomenon may lead to a decrease in policy effectiveness and deviation from the hierarchy of policy objectives, or the lack of a coordination mechanism may lead to an increase in the cost of policy implementation. It is recommended to build a "1+N" policy system, i.e. a policy system based on a core programmatic document ("1") and supporting the development of several special policies or implementation programmers ("N"). The development of special legislation for the development of assembly buildings, supporting the improvement of technical standards, quality certification, project pricing and other special policies. At the same time, the establishment of policy dynamic evaluation mechanism, every two years to carry out an evaluation of the effectiveness of policy implementation, to ensure the adaptability and effectiveness of the policy system. In order to enhance the effectiveness of policy, it is recommended to establish a matching framework of "policy tools - regional characteristics - industrial stage", carry out policy innovation pilot projects in typical regions, and gradually form replicable and scalable policy experience. At the same time, attention should be paid to the combination of policy tools to build a multi-level, three-dimensional policy support system.

Acknowledgments

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