

The Impact of Sustainable Development and Spatial Rationality Planning of Urban Buildings Under the Guidance of Local Government Policies: Environmental Policy and Green Building Design Principles

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Abstract In order to explore the relationship between the sustainable development of urban buildings and spatial rationality planning under the guidance of local government policies, this paper takes Beijing, Shanghai, and other regions as examples to conduct a questionnaire survey literature, analyzes environmental policies and green building principles, and puts forward several hypotheses based on relevant literature. Spatial rationality planning has an impact on the sustainable development of cities. Environmental policies and green building design principles have a constraining effect on the sustainable development of cities. Government policies can ensure the sustainability of urban building development and promote the rational distribution of space. The results show that there is an inevitable relationship between the rational spatial layout and the sustainable development of urban buildings, and environmental policy and green building design principles can promote the rational planning of space. Government policies can guide the rational layout of space and improve the sustainable development of cities. Therefore, spatial rationality planning is the main factor for the sustainable development of the city, government policy is the external factor, and environmental policy and green building design are the constraints. From the perspective of environmental policies and green building principles, local governments should guide spatial rationality planning to improve the sustainable development of buildings.

Keywords: • local government environmental policy • sustainable development of urban buildings • spatial rationality planning • green building • design principles

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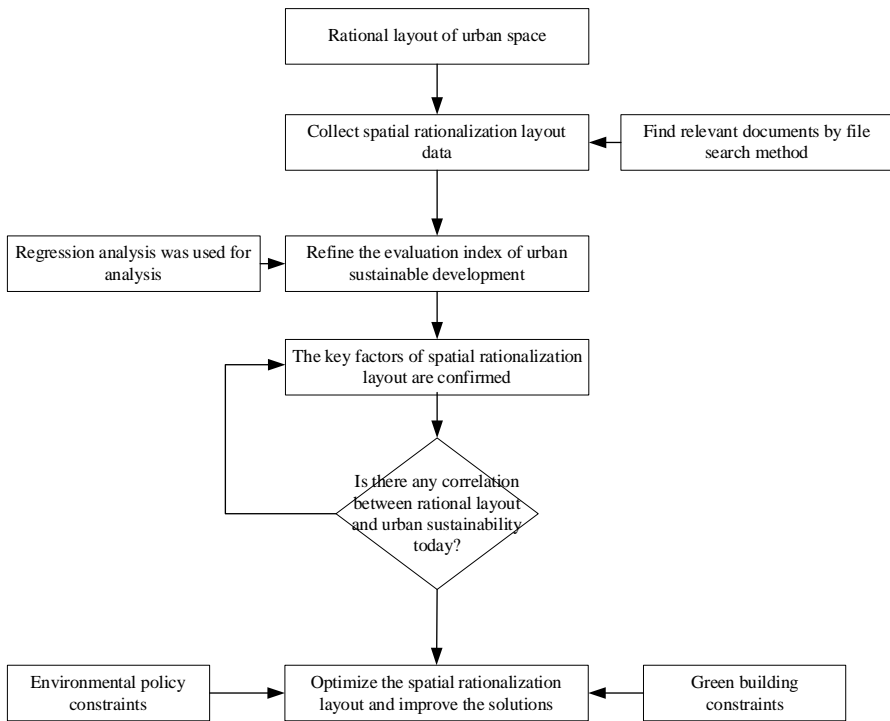
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1 Introduction

Under the premise of accelerating urbanization, the sustainable development of urban buildings has become a hot issue of social concern. Environmental policy and green building design occupy an increasingly important position in urban architecture, which is significant in achieving sustainable urban development, improving residents' quality of life (Abdelzaher et al.,2023), and reducing environmental pollution. Reasonable planning of space for the sustainable development of urban buildings guiding role, space reasonable planning can save construction costs, shorten the time and improve the sustainable constructive space of the building, reasonable planning can reduce the damage to the surrounding environment, in line with environmental policies, and how to meet the green building design principles with the environment and the environment, so the reasonable planning of space is the goal and purpose of sustainable development of the city, the current research on reasonable planning of space is mainly at the architectural level and the specific building implementation methods and strategies at the level of quantitative space joint force analysis, but the reasonable layout of space is a long-term government planning behavior, which needs the government to guide and standardize the construction policy Therefore, under the constraints of environmental policies and green buildings, the government should play its guiding role and introduce relevant policies to improve the sustainability of buildings and realize the rational layout of space. Therefore, it is of great significance to study the influence of environmental policy and green building design principles on the sustainable development of urban buildings and spatial rationality planning to solve the problems existing in urban architecture and realize the sustainable development of cities. In order to realize the sustainable development and spatial rationality planning of urban buildings, it is necessary to study how to increase the intensity and effectiveness of environmental policies and green building design principles, how to promote the development of green buildings through policy means, realize the harmonious coexistence of buildings and the environment through architectural design principles, improve energy efficiency and reduce environmental pollution through green buildings. In addition, it is also necessary to study how to realize the promotion and application of green buildings through technical means and how to promote the development of green buildings through economic means. In view of the above needs, this paper aims to study the impact of environmental policies and green building design principles on the sustainable development and spatial rationality planning of urban buildings(Ahmad et al.,2023), summarize the existing environmental policies and green building design principles through literature research and analysis, and discuss their application in the sustainable development of urban buildings and spatial rationality planning(An et al.,2023). This paper firstly collects the content and data of spatial rationality layout to improve the evaluation index of urban construction sustainability, then analyzes the influencing factors of

spatial rationalization under the constraints of environmental policy and green building policy, finds out its key influencing factors and makes effective judgments, and finally proposes corresponding measures and strategies to promote the sustainable development of urban construction according to the analysis results, and the specific planning path is shown in Figure 1.

Figure 1: The research path of this paper



2 Literature review

2.1 Urban development planning

With the rapid development of China's urbanization process and the rapid rise of the construction industry as an essential part of human society, people have put forward new requirements for the quality of life (Hofmann, 2023), and the demand for improving the residential environment and residential conditions is also more robust. Balancing economic development, environmental improvement, and energy

consumption in architectural design is still a hot topic (Jakucionyte et al., 2023). Therefore, in the design and construction process, the concept of green building design came into being. It is particularly urgent to improve the reasonable layout of residential space, with the principle of environmental protection, energy saving, and consumption reduction, fully considering the natural environment, human factors, and resource utilization (Jiang et al., 2022). Striving to reduce the impact on the environment while meeting the needs of us is not only in line with the current needs of sustainable development of urban buildings but also reflects the sustainable development concept of harmonious coexistence between man and nature.

2.2 The concept of green development

The concept of green development is a new theoretical model based on harmony, innovation, and efficiency, a new concept occurs on the basis of the theory of sustainable development and is a field that conforms to the existing social conditions in combination with the actual situation in China, and the concept of green development needs other measures as a guarantee, such as environmental protection measures, continuous measures and other related auxiliary measures, so the concept of green development is a concept that meets the needs of the current society, which can improve the sustainable construction of the city, save the space for urban construction, and promote the sustainable development of the city, and the concept of green development is a new concept model to achieve social, economic, social, environmental and other related measures, so the concept of green development is in line with the current social development situation and the needs of urban development. At present, China has issued urban development plans, urban development outlines, and comprehensive measures for urban space development in response to the concept of green development, so as to regulate the use of urban space and promote the comprehensive improvement of cities.

2.3 Specific applications of green design

Many scholars have given different opinions on the specific application of green building design. In architectural design, focusing on resource recycling and green development can better control the construction progress, save energy consumption, and reduce construction costs. The necessity of sustainable development of urban architecture pointed out the principles of protection and regeneration, cultural prominence, and sustainable development to fully meet people's pursuit of culture, improve the economic benefits of design, and maintain the balance of the ecological environment. Discussed the principles and applications of green building design, arguing that achieving a comprehensive, coordinated, and sustainable green development concept is the development direction of future buildings, and understanding the design principles and applications of green buildings is the

guarantee and practice for developing green buildings. In the new era's context, traditional architectural design concepts and green concepts are integrated to achieve the purpose and requirements of harmonious coexistence between man and nature (Lappe et al., 2023). The green building design of the comprehensive teaching building of the school is of great practical significance to improve the ecological environment, alleviate the contradiction between energy supply and demand, and create a comfortable and healthy environment.

2.4 Sustainable urban planning and development

Many scholars have different views on the sustainable development of urban buildings. Through proper design and planning, the environmental impact of buildings and the consumption of resources can be reduced. Improve the sustainability and environmental protection of buildings through the use of renewable energy (Leiringer et al., 2022), green building materials, etc. took the construction of new rural housing in Huanglou Town, Qingzhou City as an example through field investigations, user research and other methods, combined with the characteristics of the region, cultural background and residential characteristics, and used feasibility analysis to plan and transform the layout of residential space to present an ideal design scheme (Liu et al., 2022). Regarding the rationality planning of architectural space, the spatial layout of Changchun Planning Primary School is an example of analyzing and evaluating the rationality planning of spatial layout (Mbassi et al., 2023). evaluated the rationality of the overall land use plan, and through the analysis and study of the quantitative structure of land use, the overall land use plan has a certain rationality and increases the use scale of construction land.

To sum up, in urban architectural design, applying the green development concept is one of the essential ways to achieve sustainable urban development. It has become an important development direction in the current architectural field by fully considering environmental protection, energy saving, consumption reduction, and other factors. The green concept in architectural design, green building design, will play a greater role in architecture, fully realizing the harmonious coexistence of man and nature. Through reasonable design and planning, the environmental impact and resource consumption of buildings are fully reduced (Wang et al., 2021), and the sustainability and environmental protection of buildings are improved. Therefore, in the future urban architectural design, we should pay attention to the application and innovation of the concept of green development to achieve the city's sustainable development. (Wei et al., 2023) At the same time, the research on the rationality of spatial layout provides a promising paradigm for solving the problems of spatial layout, influence range, distance, and spatial positioning in urban planning,

improving the quality and function of buildings, and promoting the sustainable development of urban buildings(Xie et al.,2023).

To sum up, the rational planning of space is the prerequisite and foundation for sustainable urban development, and it is also a direct response to the green building principle of environmental protection policy, and the rational planning of space can also improve the sustainability of the city, reduce the impact of urban development on the environment, and the sustainable development of the city can improve the utilization rate of space, reduce the pollution and impact on the surrounding environment, in line with the design principles of green buildings, so the green building principles, environmental policies and government policy behaviors will have an impact on the sustainable development of the city, and promote the transformation of spatial rationality planning to further enhance the sustainability of urban development。 For this reason, I rely on spatial rationality planning and under the guidance of government policies to analyze non-sustainable development and analyze and study environmental protection policies and green design principles.

3 Research-theoretical analysis of the impact of local autonomy on the sustainable development of education

3.1 Research subjects

The spatial rationality planning and green building design related to implementing sustainable building development in Beijing, Shanghai, Guangzhou, and Shenzhen were selected as the research objects(Yang et al.,2021). The environmental protection policies, building laws and regulations, spatial rationality planning, and green building design implemented in the regions were taken as the starting point. The relevant impacts of local government environmental policies, green building design principles , spatial rational planning on the sustainable development of buildings were studied(Yi et al.,2023). The survey data was obtained in the form of a questionnaire, and the recovery rate of 300 respondents selected from the above cities for questionnaire distribution was 98%. 2 questionnaires were lost, 4 questionnaires were invalid, the content and indicators of the document were designed and revised with reference to the relevant domestic literature, and expert interviews were conducted with the preliminary questionnaires, so as to obtain the validity of the questionnaires and the rationality of the data, in the feedback of the three experts. It is better to confirm that the questionnaire is reasonable. Its validity and reliability were 0.78 and 0.81, respectively. The load rate of each question is greater than 70%, which indicates that the questionnaire designed in this paper can have a high interpretation power and can be used for later questionnaire interviews,

and the questionnaire is divided into three dimensions, namely urban building sustainability, spatial rationality planning, environmental protection policy, and green building design principles.

3.2 Research hypothesis

This paper selects the spatial rationality planning and green building design related to the implementation of sustainable building development in Beijing, Shanghai, Guangzhou, and Shenzhen as samples, collects relevant data and data utilizing field research, investigation, investigation, interview, and draws the following hypotheses(Zhai,2021).

- 1) The impact of local environmental policies on building sustainability. In order to protect the environment and achieve sustainable development, the government will formulate some local environmental policies to regulate and guide, and the construction industry, as the main economic subject of economic development in a certain region, is of great significance to the environmental protection and economic development of the region. Therefore, the standardization and guidance of local environmental policies on the environmental protection requirements, resource utilization efficiency, energy conservation, and emission reduction of construction projects can promote the architectural design to achieve the goals of environmental protection, energy conservation, and sustainable development. Make the following hypotheses:
 - H1: Local environmental policies can promote building sustainability
- 2) The impact of green building design principles on building sustainability. In terms of architectural design, energy-saving requirements, environmental protection and sustainability should be fully considered to achieve the harmonious coexistence of buildings and the natural environment. By applying green building design principles, the sustainability of buildings can be effectively improved. Therefore, under the control of green building design principles, using renewable energy, reducing the energy consumption of buildings, and other methods to improve building sustainability. Make the following hypotheses:
 - H2: Green building design principles ensure the sustainability of buildings.
- 3) The impact of local government environmental policies, building sustainability, and spatial rationality. Local governments promote more environmentally friendly and energy-saving building design by standardizing and guiding the environmental protection requirements and resource utilization efficiency of construction projects to promote the sustainable development of buildings. At the same time, the sustainable development of buildings also provides an effective guarantee for the rational planning of space. Therefore, applying green building design principles can effectively

improve the space utilization efficiency of buildings and provide a more reasonable layout for urban space planning. Make the following hypotheses:

- H3: Local government environmental policies and building sustainability have a positive impact on the rational planning of space.
- 4) The impact of local government environmental policies, green building design principles, rational spatial planning, and building sustainability. The regulation and guidance of local governments on environmental protection and resource utilization efficiency of construction projects can promote more environmentally friendly and energy-saving building design, thereby promoting the sustainable development of buildings. The green building design principle adheres to the concept of environmental protection, improves the rationality and utilization rate of spatial layout through renewable energy and scientific and reasonable layout, and lays a solid foundation for the sustainable development of buildings in the city. Therefore, under the guidance of local government policies, the sustainable development of urban buildings positively impacts spatial rationality planning, environmental policies, and green building design principles. Make the following hypotheses:
- H4: Local government environmental policies have a positive impact on building sustainability
 - H5: Green building design principles have a positive impact on building sustainability
 - H6: Rational spatial planning has a positive impact on the sustainability of buildings

3.3 Variable description and model construction

Combined with the relevant domestic documents, the existing variables are described and the corresponding calculation methods are provided, and the specific results are shown in Table 1.

Table 1: Hypotheses presented in this paper

Variable range	The name of the variable	Calculation formula
Explanatory variables	Level of Sustainability in Urban Buildings (SUBD)	$SUBD = i * (\text{number of projects implemented for sustainable development of urban buildings}) + j * (\text{evaluation of the implementation effect of sustainable development of urban buildings})$, where i and j are the weight coefficients assigned according to the specific situation.
	Spatial Rationality Planning Effectiveness (ESP)	$ESP = k * (\text{scientific and sustainable assessment of spatial planning schemes}) + l * (\text{evaluation of the actual implementation of spatial planning schemes})$, where k and l are the weight coefficients assigned according to the specific situation.
Independent variable	Policy Guidance (PG)	$PG = a * (\text{number of sustainable urban building projects under the guidance of local government policies}) + b * (\text{number of spatial rationality planning projects})$.
	Urban planning (UP)	$UP = c * (\text{scientific and sustainable urban planning scheme}) + d * (\text{spatial rationality and ecology of urban planning scheme})$, where c and d are the weight coefficients assigned according to the specific situation
	Environmental Policy (EP)	$EP = e * (\text{number of environmental protection policies}) + f * (\text{implementation of environmental protection policies})$, where e and f are the weight coefficients assigned according to the specific situation
	Green Building Design (GBD)	$GBD = g * (\text{innovation and practicality of green building design}) + h * (\text{environmental friendliness and sustainability of green building design})$, where g and h are the weight coefficients assigned according to the specific situation
Control variables	Level of Economic Development (ED)	$ED = m * (\text{total regional GDP}) + n * (\text{GDP per capita})$, where m and n are the weight coefficients assigned according to the specific situation
	Sociocultural Factors (SCF)	$SCF = o * (\text{regional education level}) + p * (\text{regional cultural diversity})$, where o and p are the weight coefficients assigned on a case-by-case basis
	Level of Technology Development (TD)	$TD = q * (\text{regional scientific and technological innovation level}) + r * (\text{regional informatization development level})$, where q and r are the weight coefficients assigned according to the specific situation

3.4 General description of the indicator survey

Table 2 shows the results of the survey and analysis of the scoring indicators according to the range of variables.

Table 2: Differences in survey results

Variable range	The name of the variable	Mean	Variance	Confidence interval	Differences	Correlation
Explanatory variables	level of sustainability in urban buildings (subd)	3.23	0.99	0.752-0.956	1.023	0.125
	spatial rationality planning effectiveness (esp)	3.72	0.17			
Independent variable	policy guidance (pg)	3.53	0.51	0.615-0.865	0.253	0.324
	urban planning (up)	3.54	0.60			
	environmental policy (ep)	3.61	0.21			
	green building design (gbd)	3.86	0.37			
Control variables	level of economic development (ed)	3.75	0.20	0.523-0.795	0.358	0.162
	sociocultural factors (scf)	3.41	0.84			
	level of technology development (td)	3.78	0.25			

From the survey results in table 2, it can be seen that the mean value of the scoring indicators is between 3~4, the variance is less than 1, the overall effect is relatively good, and the confidence interval of the pairing is positive, indicating that the credibility is high, and the difference in the data is 1.166, indicating that there is a small correlation, and the analysis of the correlation index is found to be 0.024, which further confirms the survey results. therefore, the results of the survey can be judged and analyzed in the future, and the relationship between the results of the survey and the indicators can be studied.

3.5 Analysis of the impact of each indicator on the target sample

In order to facilitate the later calculation, the variables in this paper are assigned symbolically, and the results are shown in Table 3.

Table 3: Symbolic interpretation of variables

The name of the variable	Symbol
level of sustainability in urban buildings (subd)	y1
spatial rationality planning effectiveness (esp)	y2
policy guidance (pg)	x1
urban planning (up)	x2
environmental policy (ep)	x3
green building design (gbd)	x4
level of economic development (ed)	x5
sociocultural factors (scf)	x6
level of technology development (td)	x7

At the same time, the correlation analysis of the target results is carried out, and the results are shown in table 4.

Table 4: Correlation between building sustainability and other indicators

Correlation coefficient	y1	y2	x1	x2	x3	x4	x5	x6	x7
y1	1.00	0.83	0.05	-0.83	-0.95	-0.96	-0.94	-0.96	-0.96
y2	0.83	1.00	-0.07	-0.64	-0.82	-0.82	-0.82	-0.84	-0.81
x1	0.05	-0.07	1.00	0.09	-0.01	0.00	0.04	-0.01	0.00
x2	-0.83	-0.64	0.09	1.00	0.90	0.89	0.89	0.87	0.89
x3	-0.95	-0.82	-0.01	0.90	1.00	0.98	0.96	0.97	0.97
x4	-0.96	-0.82	0.00	0.89	0.98	1.00	0.98	0.98	0.99
x5	-0.94	-0.82	0.04	0.89	0.96	0.98	1.00	0.98	0.99
x6	-0.96	-0.84	-0.01	0.87	0.97	0.98	0.98	1.00	0.99
x7	-0.96	-0.81	0.00	0.89	0.97	0.99	0.99	0.99	1.00

As can be seen from the contents of table 4, there is a positive correlation between the sustainability of the building, the rationality of the space and other indicators, indicating that there is an inevitable relationship between the two. among them, the

level of economic development, socio-cultural factors and technical factors, as well as green building design and other factors have a great impact on the rational distribution of sustainable space and the sustainability of buildings. comparatively speaking, the impact of urban planning and policy guidance is relatively small. among them, the result of policy impact is 0.05, indicating that there are obvious deficiencies in the analysis of urban sustainability and spatial planning rationality. however, the significant increase in the impact of environmental policies further indicates that the government attaches great importance to urban development and environmental sustainability, and has a strong awareness of environmental protection, so the potential for spatial rationality is greater.

For further analysis, the significance level of the above indicators is judged, and the results are shown in table 5.

Table 5: Significant level of impact test

显著水平	y1	y2	x1	x2	x3	x4	x5	x6	x7
y1		0.00	0.84	0.00	0.00	0.00	0.00	0.00	0.00
y2	0.00		0.78	0.00	0.00	0.00	0.00	0.00	0.00
x1	0.84	0.78		0.70	0.95	0.99	0.86	0.97	1.00
x2	0.00	0.00	0.70		0.00	0.00	0.00	0.00	0.00
x3	0.00	0.00	0.95	0.00		0.00	0.00	0.00	0.00
x4	0.00	0.00	0.99	0.00	0.00		0.00	0.00	0.00
x5	0.00	0.00	0.86	0.00	0.00	0.00		0.00	0.00
x6	0.00	0.00	0.97	0.00	0.00	0.00	0.00		0.00
x7	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	

From the analysis in table 5, it can be seen that the government's guiding policies, environmental policies and green building design principles are still the main influencing factors, so local governments should strengthen the implementation of policy guidance, improve environmental policies, give full play to the advantages of environmental policies, and make comprehensive judgments on green building design principles, so as to improve the rationality of space and the sustainability of urban construction.

3.6 Implementation results of different assumptions

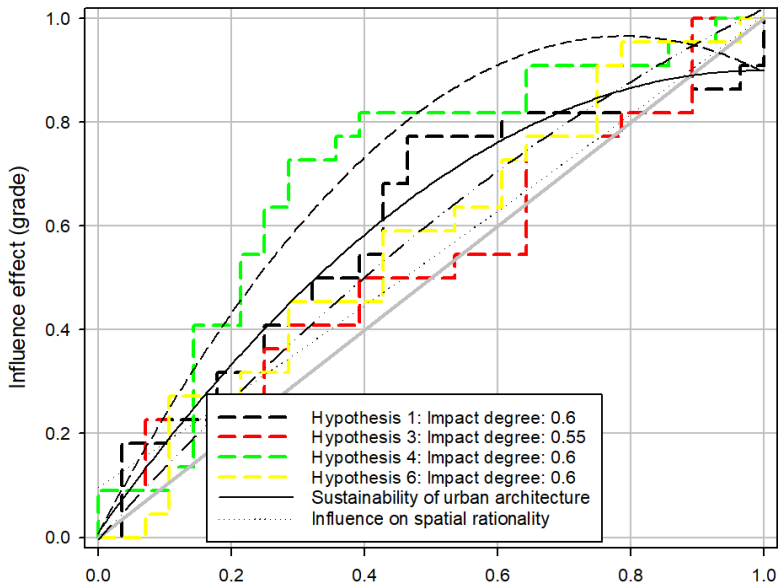
The hypothetical results of this paper are shown in table 6.

Table 6: Summary of hypothetical results

Hypothetical content	Outcome
h1: local environmental policies can promote building sustainability	establish
h2: green building design principles ensure the sustainability of buildings	not true
h3: local government environmental policies and building sustainability have a positive impact on the rational planning of space	partially established
h4: local government environmental policies have a positive impact on building sustainability	establish
h5: green building design principles have a positive impact on building sustainability	not true
h6: rational spatial planning has a positive impact on the sustainability of buildings	establish

The results in table 6 are described in the figure below.

Figure 2: Hypothetical overall analysis



According to the analysis results in figure 2, the eight indicators proposed in this paper have a great impact on spatial rationality planning, but relatively little impact on urban sustainable development. assumptions 1, 4, and 6 have an impact of 0.6, and assumption 3 has an impact of 0.5 this shows that all three hypotheses are true, but hypothesis 3 is partially true, which is consistent with the insufficient influence of government policies in the results. therefore, the government should strengthen policy guidance and conduct a comprehensive analysis with urban spatial rationality planning as the main influencing object. at the same time, various impact indicators, such as environmental policies and green building design principles, will have a significant impact on spatial rationality planning, and the impact on urban sustainability is relatively weak, so the government should strengthen relevant policy guidance and improve policy sustainability.

4 Conclusions and discussions

4.1 Strengthen local environmental policies

In order to promote the sustainable development of the construction industry, it is essential to strengthen local environmental policies, which is an important means to promote the sustainable development of buildings.

4.1.1 Clarify local management methods

Local governments should formulate high standards and strict environmental regulations, clarify the environmental protection requirements and standards for construction projects, especially in environmental impact assessments, and strictly control the development and construction process to ensure that the impact of each project on the environment is minimized. Introduce laws and regulations that meet the actual needs of local development, such as the Environmental Protection Law, the Rational Spatial Layout Planning Law, the Municipal Urban Construction Specification, the Trial Measures for the Integration of Building and Environment, etc., so as to standardize the overall environment of the city, optimize the spatial layout of the city, and make the urban development have a basis, feasible and theoretical, and can implement the overall behavior of construction enterprises and planning bureaus.

4.1.2 Integrate management methods with green buildings

The government should introduce green building implementation measures, strengthen the integration of local construction and green building design principles, promote and implement the development of green buildings, apply green building standards to specific construction practices, and conduct regular audits and

inspections of construction enterprises, improve the relevant content, and improve the norms and subsidy policies for construction enterprises. In order to further promote the development of green buildings, the government can open up green building technology projects, provide specific incentives or subsidies, encourage more construction projects to adopt green technology, and reach cooperation and consensus with relevant enterprises through special government funds to promote the development of the construction industry in the direction of environmental protection and sustainable development.

4.1.3 With the help of modern technical means

Local governments should introduce the public into the monitoring of the rational layout of urban space, and vigorously publicize relevant knowledge through various websites and social platforms, improve the public's awareness of the reasonable planning of green building space, and encourage the public to participate in the actual construction and supervision process. Local governments publicize and promote the concept and technology of green buildings through official websites, social media and other means, popularize the advantages and characteristics of green buildings to the public, and organize some publicity and promotion activities, such as green building exhibitions, special lectures, etc., to improve the public's awareness and attention to green building environmental protection.

4.2 Promote green building design

4.2.1 Design principles across green buildings

Green building design principles are an important means of ensuring the sustainability of buildings. In the process of architectural design and planning, green building design should fully consider the established principles and integrate them into the architectural design. First, green building design should use renewable resources and renewable energy sources wherever possible. The use of renewable resources should fully consider environmental factors, such as mineable wood, bamboo, etc., as well as the use of renewable energy, such as solar energy, wind energy, etc. The use of renewable resources and energy can reduce dependence on finite resources, reduce energy consumption, and help prevent environmental pollution.

4.2.2 Strengthen the supervision of energy consumption

Local governments should focus on reducing energy consumption, and regularly monitor and improve related energy consumption. Energy conservation and emission reduction are achieved through energy-saving equipment and building

insulation. In addition to the use of high-efficiency insulation materials and sealing technologies, natural conditions such as natural light and ventilation can be designed to reduce reliance on artificial lighting and ventilation. Third, green building design should focus on the quality of the indoor environment. Non-toxic, low-volatile organic compound materials are used to achieve the environmentally friendly quality of building structures and household products. At the same time, reasonable building design can improve the comfort and air quality of the indoor environment, and increase environmental awareness. At the same time, it is necessary to pay great attention to the supervision of environmental pollution. Green building design should use environmentally friendly materials and equipment, reduce indoor air pollution, use low-VOC paints and flooring, and reduce the consumption of water and land resources by building materials. Fifth, in order to better understand and apply the principles of green building design, the government should provide guidance and support to help designers master the skills and knowledge of green building design by organizing relevant training and education activities, providing green building design and construction materials and guidelines.

4.3 Optimize space planning

Optimizing space planning is a crucial way to achieve building sustainability. Local governments, construction companies, and planning and design should work together to develop sustainable spatial planning solutions that align with their regions. First, local governments, construction companies, and planners should work together to fully consider the environment and building sustainability, learn from successful cases and experiences, and formulate more reasonable spatial planning schemes based on the region's climatic, geographical, and cultural characteristics. The second is to improve the efficiency of land use. In the architectural design, the building facilities should be reasonably arranged and coordinated with the surrounding environment, such as the use of green roofs, sky gardens, and other innovative designs, which not only increase the urban green coverage but also improve the thermal insulation performance of the building and reduce the non-environmental protection factors. The third is to pay attention to spatial planning and facility layout. Build a convenient public management system, encourage people to use public facilities and means of transportation, and build convenience stores, parks, and other public facilities in residential areas, improve the quality of life of residents, increase the quality of the urban environment, and reduce the consumption of natural resources and environmental pollution. Fourth, strengthen the protection and utilization of natural resources. In the optimal design of building space, the existing natural landscape and vegetation can be used to improve the ecological value of the city, and by integrating various resources and energy in the city, making full use of them, and protecting and utilizing them, it will

help maintain the natural ecological balance and provide a more livable living environment for human beings.

4.4 Strengthen cooperation and exchanges

Strengthening cooperation and communication is the main way to achieve sustainable building development. Cooperation and exchanges between local governments, construction enterprises, and academic institutions should be strengthened to promote building sustainable development jointly. First, all parties can share resources and technologies to promote innovation and development through cooperation. Through the joint development of green building technologies and products, all parties provide theoretical support and research results for building sustainability, further promoting green building development. The second is to strengthen personnel training and knowledge popularization. Through cooperation, all parties jointly carry out training and education activities and organize seminars, forums, and lectures to provide a platform for communication and promote talent training and knowledge popularization. The third is strengthening government-enterprise cooperation and enterprise exchanges, jointly developing green building technologies and products, conducting research and development activities, improving the urban ecological environment and living quality, and enhancing their technical level and market competitiveness. At the same time, all parties can also jointly explore new business models and market opportunities through cooperation and exchanges and promote the process of building sustainability.

4.5 Improve the regulatory mechanism

Establishing and improving the supervision mechanism is a key part of ensuring the sustainable development of buildings. In order to effectively implement sustainable development, the government should strengthen the management and supervision of construction projects to ensure that they meet the requirements of environmental protection and sustainable development. First, the government should establish a sound regulatory system. Introduce building environmental protection regulations and standards in line with the actual situation and clarify construction project environmental protection requirements and standards. At the same time, the government also needs to establish an effective monitoring mechanism to ensure that construction projects are designed, constructed, and operated in compliance with environmental requirements and standards. The second is to strengthen the supervision of construction projects. Local governments should promptly dispose of and punish construction projects that do not meet the requirements of environmental protection and sustainable development requirements and propose measures such as fines and revocation of qualifications for non-compliant enterprises to maintain fair competition and market order. At the same time, the

supervision of building materials and equipment should be strengthened to ensure that they meet environmental requirements and quality standards. Third, the government needs to establish an effective regulatory mechanism in the implementation of local environmental policies, mainly to supervise the environmental review of green building projects, monitor and evaluate green building technology projects, and ensure that they comply with relevant regulations and standards, so as to test whether they have truly achieved the expected environmental protection effects.

5 Conclusion

A comprehensive analysis of spatial rationality planning shows that environmental protection policies and green building principles will have an impact on spatial rationality planning, and the degree of impact on layout is 0.6, that is, spatial rationality planning is a problem that needs to be solved at present. Due to the high degree of impact, the relationship between environmental policy and spatial rationality planning is positively correlated, with a result of 0.84, and the impact effect is short-term. The impact of environmental policies and green building principles on urban sustainability is relatively small, at 0.78 and 0.7, indicating that the impact of the impact indicators is long-term. In the process of index correlation analysis, it is found that there is a significant correlation between the guidance of government policies, spatial rational planning and urban building sustainability, and the p-value is less than 0.05, which shows that environmental policies and green building design principles are sub-correlated, and further shows that the impact of relevant policies on spatial rationality planning is very significant. Therefore, local governments should strengthen the guidance of spatial rationality planning policies, improve environmental policies, and standardize the principles of green building design, and should play a sustainable role in the design and implementation of urban construction. In addition, there are relatively many weight coefficient designs, and less data collection will affect the accuracy of the evaluation results, and the above aspects will be improved in the future to improve the research depth of the article.

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Notes:

The weight coefficients of i, j, k, l, a, b, c, d, e, f, g, h, m, n, o, p, q, and r in the calculation formula are all obtained by expert surveys.

From the description of the variables in Table 1, it can be seen that the weight coefficient needs to be obtained in the calculation process of each index. In general, the weighting coefficient is calculated objectively. However, the calculation of government policies, environmental policies, and green building design is complex, so the calculation of the weight coefficient in this paper is divided into two steps. The first step is to calculate based on the historical data of policy implementation, and the objective weight coefficient = number of violations/total number. The second step is the subjective rating of the effect of the policy implementation by experts. Final weight coefficient = objective weight coefficient * subjective score.

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