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Published in:
Sustainability (Switzerland)

Published: 01/07/2023

Document Version:
Final Published version, also known as Publisher’s PDF, Publisher’s Final version or Version of Record

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Publication record in CityU Scholars:
Go to record

Published version (DOI):
10.3390/su151310596

Publication details:

Citing this paper
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Article
Exploring the Key Factors Influencing Sustainable Urban Renewal from the Perspective of Multiple Stakeholders

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Abstract: A successful urban renewal policy, process, and project implementation should advocate sustainable development from economic, social, and environmental perspectives. As different stakeholders have different interests and insights into the importance of the environment, housing, social wellbeing, and economic concerns, they often have different ideas concerning how to develop urban renewal strategies and implement projects. Although previous studies have focused on the opinions of governments and academics, fewer studies have considered the direct beneficiaries of urban renewal—the residents. This study examined the key factors that influence sustainable urban renewal from the perspective of multiple stakeholders, including local governments, residents, developers, and designers. Social network analysis (SNA) and the reliability interval method (RIM) were integrated to form a SNA-RIM analytical framework to analyze the importance of the influencing factors. The results showed that the adjustment of the regional industrial structure, employment opportunities, and environmental qualification improvement had the most significant influence on sustainable urban renewal from economic, social, and environmental perspectives, respectively. In addition, different types of stakeholders do not value sustainability indicators in the same way. Local governments place more emphasis on return on investment, employment opportunities, and environmental qualification improvement, whereas residents focus on per capita income growth rate, public service facilities, and convenience of municipal infrastructure. Developers are most interested in the land value growth rate, public service facilities, and effective land use space, whereas designers attach the greatest importance to the adjustment of regional industrial structure, public service facilities, and effective land use space. Therefore, this study can help urban planners and decision makers balance the interests, seek common benefits for different types of stakeholders, and improve sustainable and inclusive urban renewal.

Keywords: sustainability; urban renewal; influencing factors; multiple stakeholders; social network analysis; reliability interval method; collaborative decision making

1. Introduction

With accelerated urbanization, many cities have been facing problems such as land scarcity, building decay, and environmental pollution. Urban renewal can improve land use efficiency, the urban living environment, and quality of life for residents [1]. An increasing number of countries and regions have promoted urban renewal initiatives [2]. However, previous experiences have shown that large-scale physical reconstruction has caused many problems, such as social exclusion, loss of unique local characteristics, and high housing prices [3]. Urban renewal policies and strategies should not only focus on physical rehabilitation, but also be committed to social and environmental development. Therefore, urban renewal and sustainable development should be combined because they are similar in terms of social, economic, and environmental sustainability [4].
In order to implement effective and sustainable urban renewal projects, it is important to first understand the process underlying them. The process of urban renewal involves various stakeholders and interrelated activities that complicate urban renewal planning, decision making, implementation, and evaluation [5,6]. Sustainable urban renewal requires the collaboration and participation of diverse stakeholders to pursue common interests [2]. A diverse group of participants not only provides comprehensive insights, but it also mitigates social contradictions. Therefore, collaborative decision making, with regard to sustainable urban renewal, can balance the demands of diverse stakeholders to promote sustainable development [7].

The question of how to implement sustainable urban renewal has become an important and widely discussed topic. Recent studies have focused on stakeholders and their engagement and evaluation of sustainable urban renewal [2,8]. Although some studies have focused on the sustainability assessment of urban renewal, most of them involve experts such as academics and government officials in the assessment process [9,10]. However, different stakeholders sometimes weight environment, housing, social welfare, and economic concerns differently due to different perspectives. Previous studies were less concerned with the preferences and demands of residents and developers regarding the sustainability of urban renewal. There is also a lack of research comparing the concerns of different stakeholders.

Therefore, this study developed a SNA-RIM analytical framework to explore the key factors that influence sustainable urban renewal from the perspective of multiple stakeholders. Social network analysis (SNA) can describe and measure the relationships between factors and explore the key factors in the database. Then, a reliability internal method (RIM) was applied to evaluate the weighting of each factor in accordance with the concerns of different stakeholders. The results provide further insight into collaborative decision making for sustainable and inclusive urban renewal. The results can help urban planners and policy makers determine which actions are most effective in balancing the diverse interests of different stakeholders, thus providing the basis for the formulation of sustainable urban renewal planning, policies, and corresponding strategies.

2. Literature Review
2.1. Multiple Stakeholders of Sustainable Urban Renewal

The concept of sustainable development dates back to the World Conservation Strategy, published in 1980 by the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme (UNEP), and the World Wildlife Fund (WWF). Although there is no universally accepted definition of sustainability, there is a broad consensus that sustainable development encompasses economic, social, and environmental issues [11,12]. Since urban renewal aims to improve economic, social, and environmental problems in older areas, it is closely related to sustainability [13,14]. Sustainable urban renewal can solve a number of urban problems, including deterioration of urban functions, social exclusion, and environmental pollution [15,16]. It can also improve the effective use of land resources, promote the rehabilitation of dilapidated buildings, and reduce community health risks [17,18]. However, urban renewal is quite a difficult task because numerous stakeholders are involved in the decision-making process [19].

Urban renewal projects involve a variety of stakeholders from both public and private sectors, including governments, developers, designers, and residents [20,21]. As different stakeholders place different weights on environment, housing, social welfare, and commercial concerns, different stakeholders frequently have different views on how urban renewal strategies should be developed and how initiatives should be implemented [22]. Urban renewal policy, planning, and project implementation are greatly influenced by the relationships between these different stakeholders, the characteristics of the different types of partnerships, and the ways in which different stakeholders operate [5,23]. Some scholars pointed out that governments played the most important role in urban renewal initiatives and they focused on a ‘top-down’ approach [24,25]. For example, governments tend
to insert memorial buildings into decaying urban centers to revitalize the region [26,27]. Moreover, some scholars suggested that private sector stakeholders also contributed to urban renewal projects and that residents’ concerns were important in order to guide future renewal in a sustainable manner [23,28]. Both the ‘top-down’ approach and the ‘bottom-up’ approach should be used appropriately to achieve sustainability in urban renewal [29,30]. Therefore, it is necessary to better coordinate the relationships between different stakeholders during the process of urban renewal. Collaborative decision making between multiple stakeholders during the process of urban renewal is becoming increasingly important for sustainable and inclusive urban development [22,31].

2.2. Multiple Factors of Sustainable Urban Renewal

Previous studies have suggested that sustainable urban renewal assessment can help stakeholders improve their strategies or solutions [2]. Although there is still no unified concept, it is widely recognized that social, economic, and environmental factors are the three pillars of sustainable development [32,33]. Social factors refer to social population, transportation and accessibility, resource utilization, among others [34,35]. Economic factors are also important, including labor force participation rate, per capita income, distribution of economic activities, and distribution of small commodity economies [36]. In addition, environmental factors such as waste collection, electricity consumption, air quality, water consumption, and noise have a significant impact on urban renewal projects [37]. Sustainable urban renewal should consider social, economic, and environmental aspects. However, there is still a lack of consensus concerning which sub-indicators can be used for the sustainability assessment of urban renewal and how to determine the weighting of the indicators [2]. Therefore, it is necessary to use the indicator-based approach to identify the key factors that influence sustainable urban renewal.

In previous studies, some factor approaches including the Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), and Delphi method have been used to build the sustainable assessment model and urban renewal framework. These methods are commonly adopted to evaluate the data from experts such as academics, designers, and government officials, but the discussion concerning other key stakeholders, such as developers and residents, is not extensive enough. For example, Zheng et al. conducted three expert interviews to collect opinions concerning the decision support model. The three experts included a professional from the Urban Renewal Authority (URA), a planner from the Planning Department, and a well-known professor in the relevant field [38]. Yildiz et al. conducted an AHP involving academic and practitioner professionals (such as contractors, architects, engineers, and urban planners) to assess economic, environmental, and social sustainability [39]. Lin et al. presented an ex ante decision-making model to evaluate the sustainability of urban renewal projects from the government’s perspective. Ten experts from academic, government, and planning departments were interviewed to evaluate 13 criteria from three dimensions: economic, social and cultural, and environmental [40].

Some studies emphasized that government departments, private agencies, and residents had an important influence on sustainable urban renewal, and researchers invited these stakeholders to evaluate the sustainability of urban renewal projects. However, little attention was paid to the similarities and differences between the demands of the various stakeholders. For example, Hemphill et al. (2004) created a multi-criteria evaluation framework using AHP, multi-criteria decision analysis (MCDA), and the Delphi method [13,14]. The evaluation of six cases by experts (planners, architects, property developers, and academics) and users (residents, end users, and employees) suggests that indicators can comprehensively assess the performance of individual agencies, the cost of the renewal project, and the effectiveness of partnerships to improve economic interests. To understand citizens’ concerns about sustainable urban renewal, Zewdie et al. invited both multidisciplinary experts and residents to identify indicators of urban sustainability [29].

Urban renewal projects are expected to deliver economic, social, and environmental improvements. The assessment of the sustainability of urban renewal projects is usually
based on the opinion of experts. However, other stakeholders, such as developers and residents, have been considered less in previous research. As key stakeholders and future users of urban renewal projects, the evaluation of sustainable urban renewal by developers and residents is as important as that of experts. Therefore, this study examines the key factors influencing sustainable urban renewal from the perspective of multiple stakeholders, including residents, developers, designers, and local governments. This research pays more attention to the concerns of various stakeholders to enable sustainable and inclusive urban renewal.

3. Methodology

3.1. Methods

This study integrated SNA and RIM to assess the preferences of different stakeholders regarding key factors that influence sustainable urban renewal. SNA is a method for the quantitative analysis of relationship data. It extensively uses graph theory and a mathematical model to study the relationships between different elements in the network. Currently, it has found its way into the fields of sociology, statistics, urban planning and other disciplines. SNA not only reveals the overall characteristics of the network structure, but it also reflects the position of individual objects in the network structure [41]. MCDA can help decision makers solve planning and decision problems. MCDA usually uses fixed integers or pairwise comparisons to evaluate the importance of each variable [42]. However, sometimes respondents cannot directly provide an integer evaluation for some indicators. Pairwise comparison can easily cause confusion, especially when there are many indicators. RIM asks respondents to provide an interval range evaluation for each index, which can reduce arbitrariness and confusion [43,44]. Compared with other MCDA methods (such as AHP), this method is clearer and easier to use, and is more suitable for assessing participants’ views on a large number of indicators [45].

Figure 1 shows the framework of the SNA-RIM analysis, which includes three main steps. First, high-frequency factors were collected for the statistical analysis of relevant papers dealing with sustainable urban renewal. Then, SNA was applied to calculate the objective weights of the high-frequency factors. As too many indicators would confuse the participants when completing their evaluations, the nine factors with the greatest weighting in each category (with a weighting greater than 0.01 and a frequency greater than 10), for a total of 27 factors, were used as important factors influencing sustainable urban renewal. Finally, four types of stakeholders, including government officials, developers, residents, and designers, were invited to participate in this survey. Using RIM, the importance of the influencing factors on sustainability was measured. Based on these three steps, the SNA-RIM method not only integrates the experience of relevant research, but it also reflects the demand for different types of stakeholders. It avoids the bias of expert weighting, and the evaluation results are more accurate and reasonable.

3.1.1. Influencing Factors Identification

The influencing factors were identified in two steps. In the first step, relevant studies evaluating sustainable urban renewal were retrieved in order to establish the influencing factors. Urban regeneration, urban renewal, urban redevelopment, and urban rehabilitation share similar meanings but are used in different countries or regions [2]. Therefore, the search rule (“urban regeneration” OR “urban renewal” OR “urban redevelopment” OR “urban rehabilitation”) AND (“sustainability” OR “sustainable development”) was entered into the search criterion Topic in the Web of Science database. The Web of Science database contains more than three citation indexes (e.g., SCI, SSCI, A&HCI) that recruit a variety of authoritative and influential international academic journals. The procedure for retrieving articles was as follows (Figure 2):
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1. The above topics were scanned in the databases SCI and SSCI in the Web of Science in the period 1 January 2000–31 October 2021. Five-hundred and seven articles were retrieved.
2. One-hundred and forty-eight papers were rejected due to repetition.
3. Two-hundred and eighty-three papers were rejected because the abstract of each paper excluded irrelevant papers.
4. Seventy-six papers were scanned, and 42 papers were excluded because the evaluation indicators considered only one dimension. Finally, 34 papers were selected for factor identification preparation.

In the second step, high frequency influencing factors were identified, and they were divided into three aspects: economic factors, social factors, and environmental factors. The factors used to evaluate sustainability were extracted from 34 relevant papers. After deleting duplicate factors and merging similar factors, 32 economic factors, 34 social factors, and 35 environmental factors were identified.

Figure 1. The analysis framework.

(1) The above topics were scanned in the databases SCI and SSCI in the Web of Science in the period 1 January 2000–31 October 2021. Five-hundred and seven articles were retrieved. (2) One-hundred and forty-eight papers were rejected due to repetition. (3) Two-hundred and eighty-three papers were rejected because the abstract of each paper excluded irrelevant papers. (4) Seventy-six papers were scanned, and 42 papers were excluded because the evaluation indicators considered only one dimension. Finally, 34 papers were selected for factor identification preparation.

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Figure 2. The procedure for retrieving papers.

3.1.2. Social Network Analysis

In accordance with the characteristics of urban renewal, it is necessary to search the existing relevant literature and extract the most important influencing factors for sustainable urban renewal. Therefore, SNA was used in this study to explore the key factors that influence the decision-making processes of different stakeholders with regard to sustainable urban renewal.

The objective weight of the influencing factors is calculated via centrality analysis, and the important nodes in the core position of each network are identified. These important nodes represent the key factors influencing sustainable urban renewal. SNA creates the community map for the social network analysis of each dimension; then, the betweenness centrality is calculated to determine the weight of the variables. The betweenness centrality is calculated as follows:

\[
C_B(n_i) = \sum_{j<k} g_{jk}(n_i) / g_{jk}
\]

where, \(C_B(n_i)\) is the betweenness centrality and \(g_{jk}\) is the number of connections between nodes \(n_j\) and \(n_k\). \(g_{jk}(n_i)\) is the number of paths through node \(n_i\) between node \(n_j\) and \(n_k\), and \(i, j, \) and \(k\) refer to observation nodes.

3.1.3. Analysis Using the Reliability Interval Method

In this study, the fuzzy RIM was used to measure the importance of influencing factors on sustainable urban renewal from the perspective of multiple stakeholders. Participants were required to assign a fuzzy grade (0 to 7) to each attribute (Figure 3). Mathematically, the interval grade for the \(j_{th}\) attribute \([a_j, b_j]\) is shown as:

\[
[a_j, b_j] = \frac{1}{M} \sum_{i=1}^{M} [l_{ij}, r_{ij}],
\]
According to Lin et al., the urban renewal practice in Shenzhen can be categorized into policies to support urban renewal, which includes regulations at the legal level, local level, technical level, and operation level [47]. Refined institutions have generated diverse social, economic, and environmental benefits due to the constraints on lands and space. Since 2003, Shenzhen has been experimenting with new actions and policies on urban renewal to boost social, economic, and environmental benefits due to the constraints on lands and space. According to Lin et al., the urban renewal practice in Shenzhen can be categorized into three types: government-led mode, Government-market cooperative mode, and multi-stakeholder cooperative mode [46]. Moreover, Shenzhen has structured a pyramid of policies to support urban renewal, which includes regulations at the legal level, local level, technical level, and operation level [47]. Refined institutions have generated diverse practices, such as in Hubei [48], Shuwei [49], and Nantou [50,51]; these places have become

\[
0 \leq l_{ij} \leq r_{ij} \leq N, \quad i = 1, 2, \ldots, M, \quad j = 1, 2, \ldots, J,
\]

where:
- \(J\) — number of attributes,
- \(M\) — number of respondents,
- \(N\) — number of grades,
- \([a_{ij}, b_{ij}]\) — interval grade for the \(j_{th}\) attribute belonging to the interval grade given by all respondents,
- \(a_{ij}\) — minimum grade for the \(j_{th}\) attribute given by all respondents,
- \(b_{ij}\) — maximum grade for the \(j_{th}\) attribute given by all respondents,
- \([l_{ij}, r_{ij}]\) — interval grade for the \(j_{th}\) attribute belonging to the interval grade given by the \(i_{th}\) respondent,
- \(l_{ij}\) — minimum grade for the \(j_{th}\) attribute given by the \(i_{th}\) respondent,
- \(r_{ij}\) — maximum grade for the \(j_{th}\) attribute given by the \(i_{th}\) respondent.

The grade eigenvalue of the \(j_{th}\) attribute \(\zeta_j\) is:

\[
\zeta_j = \frac{1}{2} (a_j + b_j) = \frac{1}{M} \sum_{i=1}^{M} l_{ij} + r_{ij}. \tag{3}
\]

Then, the normalized weight of the \(j_{th}\) attribute \(\eta_j\) is measured:

\[
\eta_j = \frac{\zeta_j}{\sum_{i=1}^{M} \zeta_i}. \tag{4}
\]

RIM provides the parameter of reliability to verify the results of the statistical analysis. For the definition of reliability, the following parameters are introduced:

\[
\delta_{\zeta_j} = \{x \mid |x - \zeta_j| \leq 0.5\}, \tag{5}
\]

\[
I_j = \{i \mid [l_{ij}, r_{ij}] \cap \delta_{\zeta_j} \neq \phi\}. \tag{6}
\]

Then, \(|I_j| / M\) is called the reliability of the \(j_{th}\) attribute into the \(\eta_j\) grade, where \(|I_j|\) is the number of set \(I_j\). \(|I_j| / M\) evaluates the proportion of respondents’ fuzzy ranges that fall within the average grade.

3.2. Questionnaire Survey

3.2.1. Study Area

Shenzhen is located in Guangdong province, southern China (Figure 4). The city has strong economic momentum and is among the top four megacities in China. Since 2003, Shenzhen has been experimenting with new actions and policies on urban renewal to boost social, economic, and environmental benefits due to the constraints on lands and space. According to Lin et al., the urban renewal practice in Shenzhen can be categorized into three types: government-led mode, Government-market cooperative mode, and multi-stakeholder cooperative mode [46]. Moreover, Shenzhen has structured a pyramid of policies to support urban renewal, which includes regulations at the legal level, local level, technical level, and operation level [47]. Refined institutions have generated diverse practices, such as in Hubei [48], Shuwei [49], and Nantou [50,51]; these places have become
learning models for Chinese cities. Recent projects have started to consider the long ignored and marginalized demands of residents, thus integrating bottom-up participation into the top-down decision-making process. The ultimate goal is to achieve a human-centered development philosophy and maintain social and economic vibrancy.

Figure 4. Study area.

3.2.2. Data Collection

The sustainable evaluation of urban renewal, using four types of stakeholders, was conducted via a questionnaire survey in Shenzhen. The respondents included the main stakeholders of urban renewal projects, including local governments, developers, residents, and designers. Local government respondents included government officials from the Shenzhen Urban Renewal Authority and Shenzhen Planning and Natural Resources Bureau staff responsible for urban renewal projects. Employees of real estate development and management companies involved in urban renewal projects were also interviewed. Architects, planners, and engineers involved in the design of urban renewal projects were invited to participate in this questionnaire survey. To match the sample size of the governments, developers, and designers, the sample size of residents was constrained to the same number as the former, which means that random sampling techniques are not appropriate in this study. Instead, members of the community council were selected to represent the residents. In Shenzhen, the community council is a local organization established by residents to represent their interests. Members of the community council of a planned renewal project, Yin Zhuling Village, were selected as the respondents of our study.

In order to understand the sustainable evaluation of urban renewal with different stakeholders, the questionnaire consisted of two parts: basic information about the respondents and evaluation data. The first part included four questions asking respondents about their gender, age, job, and involvement in urban renewal. The second part aims to collect data on the respondents’ evaluations of each indicator of the sustainable evaluation system. Respondents were asked to evaluate each indicator in intervals (including a maximum and minimum score) that could reflect the indicator’s importance with regard to sustainability. The criteria for the ratings can be found in Table 1.
Table 1. The 0–7 point scale.

<table>
<thead>
<tr>
<th>Intensity of Importance</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No importance</td>
</tr>
<tr>
<td>1</td>
<td>Little importance</td>
</tr>
<tr>
<td>3</td>
<td>Moderate importance</td>
</tr>
<tr>
<td>5</td>
<td>Strong importance</td>
</tr>
<tr>
<td>7</td>
<td>Very strong importance</td>
</tr>
<tr>
<td>2, 4, 6</td>
<td>Immediate values between preceding scale values</td>
</tr>
</tbody>
</table>

4. Results
4.1. Indicators of Sustainable Urban Renewal Assessment
4.1.1. Results of Social Network Analysis

Using Gephi social network analysis software, the betweenness centrality of each factor was calculated. The objective weight of each indicator was determined after normalization. The visual network analysis of sustainable urban renewal indicators is shown in Figures 5–7. Twenty-seven influencing factors with high betweenness centralities, and which were close to the network center, were extracted. In addition, functional mix utilization was excluded because its frequency was less than 10. Finally, 26 factors with a high impact and high frequency were identified as important influencing factors for sustainable urban renewal.

Figure 5. Economic indicators’ network community. A. Residential price index; B. per capita income growth rate; C. GDP per capita growth rate; D. construction, operation, and maintenance cost; E. investment amount; F. return on investment; G. plot ratio; H. business service industry value; I. promotion of small business development; J. leisure and entertainment industry value; K. land value growth rate; L. functional rationality and compatibility; M. business operation level; N. attracting foreign investment; O. functional mix utilization; P. demolition and relocation compensation cost; Q. length of conversion; R. adjustment of regional industrial structure; S. financial risk factor; T. enhancing business competitiveness; U. talent attraction; V. heritage building protection fee; W. dynamic payback time; X. renewal completed area; Y. financial net present value; Z. cultivating high-tech and professional industries; A’. increasing local government finance and tax revenue; B’. net population density; C’. net labor density; D’. external cost; E’. building flexibility; F’. informal economy.
Figure 6. Social indicators’ network community. A. employment opportunities; B. improving the quality of life of local residents; C. residential area per capita; D. coordination degree of institutional setting; E. supporting policies; F. information disclosure; G. public participation; H. public service facilities; I. safety facilities; J. neighborhood cultural activities; K. protecting residents’ neighborhoods; L. promoting social integration; M. sense of identity and belonging; N. overall satisfaction; O. adapting to the changing needs of the future; S. attractiveness to residents outside the renovation area; T. harmony with the surrounding community; U. contribution to the development of culture, education, science, and technology in the area; V. demonstration effect on similar projects; W. cultivation degree of quality improvement for related managers; X. inheritance of architectural style; Y. providing different types of housing for different classes of residents; Z. other social measures; A’. achieving regional development goals; B’. protecting stakeholders’ interests; C’. consistency and constraint; D’. maximizing the number of users; E’. urban design; F’. locally produced food; G’. compliance with ethical standards in the development process.

4.1.2. Determination of the Indicators of the Sustainable Urban Renewal Assessment

Based on the results of the SNA, indicators for the evaluation of sustainable urban renewal were defined. These indicators included a total of 26 indicators in three dimensions (Table 2). These key factors are composed of eight economic factors, nine social factors, and nine environmental factors.

4.2. Results of Reliability Interval Method

In this study, several stakeholders were asked to evaluate the importance of the influencing factors for sustainable urban renewal. Four types of participants were included: local governments, developers, residents, and designers. One-hundred and twenty respondents (30 respondents for each type), including experts who have participated in urban renewal projects and residents who lived in the renewal areas, were interviewed between May and July 2022. The experts were from the Urban Renewal Authority, Planning Department, real estate development companies, colleges, and urban planning and design institutes. One-hundred and nine valid questionnaires were evaluated, including 25 ques-
tionnaires from local governments, 26 questionnaires from developers, 28 questionnaires from residents, and 30 questionnaires from designers.

The significance of the evaluation indicators was calculated by RIM and included the three dimensions: economic, social, and environmental indicators. The results are shown in Table 3.

Figure 7. Environmental indicators’ network community. A. improve the per capita urban road area; B. the improvement degree of landscape function; C. the greening rate; D. the public activity space; E. the convenience of public transportation; F. the accessibility of facilities; G. the convenience of the parking lot; H. the convenience of municipal pipe network infrastructure; I. improve the urban sanitation; J. the firefighting facilities; K. the barrier free facilities; L. the construction quality; M. the sign system configuration; N. the treatment of three wastes; O. the impact of environmental noise; P. the compatibility with the adjacent environment; Q. the suitability of walking; R. effective use of land space; S. energy conservation; T. perfection of the land ownership mechanism; U. implementation of environmental monitoring and management, laws, and regulations; V. supporting resources; W. reduction of heat island effect; X. utilization rate of renewable energy; Y. water resource management; Z. green building; A’. air quality; B’. impact on the ecological environment; C’. improvement of environmental quality; D’. arranging the maintenance and management of buildings, facilities, and space; E’. expand emergency preparedness capacity; F’. quality of automobile transportation infrastructure; G’. promote biodiversity and networks; and H’. use of natural resources for research and production.
Table 2. Indicators of the sustainable urban renewal assessment.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Sub-Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Construction, operation, and maintenance cost;</td>
</tr>
<tr>
<td></td>
<td>Adjustment of regional industrial structure;</td>
</tr>
<tr>
<td></td>
<td>Per capita income growth rate;</td>
</tr>
<tr>
<td></td>
<td>Plot ratio;</td>
</tr>
<tr>
<td></td>
<td>Residential price index;</td>
</tr>
<tr>
<td></td>
<td>Investment amount;</td>
</tr>
<tr>
<td></td>
<td>Return on investment;</td>
</tr>
<tr>
<td></td>
<td>Land value growth rate.</td>
</tr>
<tr>
<td>Society</td>
<td>Safety facilities;</td>
</tr>
<tr>
<td></td>
<td>Protecting residents’ neighborhoods;</td>
</tr>
<tr>
<td></td>
<td>Inheritance of architectural style;</td>
</tr>
<tr>
<td></td>
<td>Overall satisfaction;</td>
</tr>
<tr>
<td></td>
<td>Employment opportunities;</td>
</tr>
<tr>
<td></td>
<td>Public service facilities;</td>
</tr>
<tr>
<td></td>
<td>Public participation;</td>
</tr>
<tr>
<td></td>
<td>Neighborhood cultural activities;</td>
</tr>
<tr>
<td></td>
<td>Historical and cultural preservation.</td>
</tr>
<tr>
<td>Environment</td>
<td>Convenience of municipal infrastructure;</td>
</tr>
<tr>
<td></td>
<td>Environmental qualification improvement;</td>
</tr>
<tr>
<td></td>
<td>Public transport convenience;</td>
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<tr>
<td></td>
<td>Effective land use space;</td>
</tr>
<tr>
<td></td>
<td>Landscape function improvement.</td>
</tr>
</tbody>
</table>

Table 3. The results of the reliability interval method.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Sub-Indicator</th>
<th>Interval Grade</th>
<th>Grade Eigenvalue</th>
<th>Weight</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Construction, operation, and maintenance cost;</td>
<td>[3.79, 5.50]</td>
<td>4.64</td>
<td>0.119</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>Adjustment of regional industrial structure;</td>
<td>[4.47, 6.14]</td>
<td>5.30</td>
<td>0.136</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Per capita income growth rate;</td>
<td>[4.37, 5.91]</td>
<td>5.14</td>
<td>0.132</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Plot ratio;</td>
<td>[3.51, 5.15]</td>
<td>4.33</td>
<td>0.111</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>Residential price index;</td>
<td>[3.81, 5.43]</td>
<td>4.62</td>
<td>0.118</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Investment amount;</td>
<td>[3.76, 5.47]</td>
<td>4.61</td>
<td>0.118</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>Return on investment;</td>
<td>[4.32, 5.95]</td>
<td>5.14</td>
<td>0.132</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Land value growth rate.</td>
<td>[4.4, 6.06]</td>
<td>5.26</td>
<td>0.135</td>
<td>0.65</td>
</tr>
<tr>
<td>Society</td>
<td>Safety facilities;</td>
<td>[4.42, 5.93]</td>
<td>5.17</td>
<td>0.116</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>Protecting residents’ neighborhoods;</td>
<td>[4.14, 5.68]</td>
<td>4.91</td>
<td>0.110</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Inheritance of architectural style;</td>
<td>[3.71, 5.31]</td>
<td>4.51</td>
<td>0.101</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>Overall satisfaction;</td>
<td>[4.19, 5.83]</td>
<td>5.01</td>
<td>0.113</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Employment opportunities;</td>
<td>[4.52, 6.09]</td>
<td>5.31</td>
<td>0.119</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Public service facilities;</td>
<td>[4.74, 6.28]</td>
<td>5.51</td>
<td>0.124</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Public participation;</td>
<td>[3.68, 5.29]</td>
<td>4.49</td>
<td>0.101</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Neighborhood cultural activities;</td>
<td>[3.93, 5.54]</td>
<td>4.73</td>
<td>0.106</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Historical and cultural preservation.</td>
<td>[4.12, 5.69]</td>
<td>4.90</td>
<td>0.110</td>
<td>0.67</td>
</tr>
</tbody>
</table>
Table 3. Cont.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Sub-Indicator</th>
<th>Interval Grade</th>
<th>Grade Eigenvalue</th>
<th>Weight</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Greening rate;</td>
<td>[4.31, 5.85]</td>
<td>5.08</td>
<td>0.109</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>Facility accessibility;</td>
<td>[4.35, 5.88]</td>
<td>5.11</td>
<td>0.110</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>Energy conservation;</td>
<td>[4.26, 5.74]</td>
<td>5.00</td>
<td>0.107</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td>Waste treatment;</td>
<td>[4.44, 5.97]</td>
<td>5.21</td>
<td>0.112</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>Convenience of municipal infrastructure;</td>
<td>[4.39, 5.90]</td>
<td>5.14</td>
<td>0.111</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>Environmental qualification improvement;</td>
<td>[4.69, 6.18]</td>
<td>5.44</td>
<td>0.117</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>Public transport convenience;</td>
<td>[4.46, 6.00]</td>
<td>5.23</td>
<td>0.112</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Effective land use space;</td>
<td>[4.55, 6.06]</td>
<td>5.31</td>
<td>0.114</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>Landscape function improvement.</td>
<td>[4.22, 5.80]</td>
<td>5.01</td>
<td>0.108</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Figure 8 shows the weighting of each indicator, reflecting the influence of the different evaluation indicators on the sustainability of urban renewal in each category. In terms of economic development, stakeholders believe that the adjustment of regional industrial structure has the greatest influence. The land value growth rate, per capita income growth rate, and return on investment are important for economic development. In terms of social indicators, public service facilities is the most important indicator for stakeholders. Employment opportunities, safety facilities, and overall satisfaction are also important. As for the environmental dimension, the sustainability of urban renewal is mainly reflected in environmental qualification improvement. Effective land use space, public transport convenience, and waste treatment have a great influence on the environmental development of urban renewal.

This study focuses on the diverse demands of multiple stakeholders for sustainable urban renewal, and it uses the RIM to measure the evaluation data of four types of stakeholders. Figures 9–11 show the changes in the evaluations given by the four types of stakeholders with regard to the following three types of indicators: economic, social, and environmental.

Regarding the impact of urban renewal on economic development, local governments put more emphasis on return on investment, adjustment of regional industrial structure, and investment amount. Residents focus on per capita income growth rate, land value growth rate, and adjustment of regional industrial structure. For developers, land value growth rate, adjustment of regional industrial structure, and return on investment are most important. Designers are most concerned with adjustment of regional industrial structure, return on investment, and per capita income growth rate.

Regarding the impact of urban renewal on social development, local governments place the highest importance on employment opportunities, public service facilities, and safety facilities. For residents, public service facilities, employment opportunities, and protecting residents’ neighborhoods are most important. Developers place more importance on public service facilities, employment opportunities, and safety facilities. Designers focus on public service facilities, employment opportunities, and safety facilities.

As for the impact of urban renewal on environmental development, local governments mainly focus on environmental qualification improvement, public transport convenience, and convenience of municipal infrastructure. Residents pay more attention to convenience of municipal infrastructure, environmental qualification improvement, and facility accessibility. Developers pay the most attention to effective land use space, environmental qualification improvement, and facility accessibility. Designers focus on effective land use space, environmental qualification improvement, and energy conservation.
This study focuses on the diverse demands of multiple stakeholders for sustainable urban renewal, and it uses the RIM to measure the evaluation data of four types of stakeholders. Figures 9–11 show the changes in the evaluations given by the four types of stakeholders with regard to the following three types of indicators: economic, social, and environmental.

**Figure 8.** Urban renewal sustainability evaluation index weights.

**Figure 9.** Economic indicator weights.

**Figure 10.** Social indicator weights.

**Figure 11.** Environmental indicator weights.
5. Discussion

Unlike the construction of new towns, urban renewal involves complex ownership, land use, geopolitical conditions, and social networks. The various stakeholders in urban renewal programs have very different interests [22]. Since the diverse interests of various stakeholders influence the final decisions, how to balance the economic, social, and environmental demands of various stakeholders is an important issue for sustainable urban renewal [52]. In cases of urban renewal, the performance of project implementation and the impact on sustainable development are largely due to the cooperation of various stakeholders [53]. Therefore, it is necessary to understand the demands and concerns of multiple stakeholders regarding the sustainability of urban renewal; then, it is possible to explore how policies and strategies can contribute to more sustainable development.

5.1. The Demand of Various Stakeholders

Local governments play an important role in the urban renewal process, and have high demands for sustainable development with regard to economic, social, and environmental factors [24]. Primarily, local governments focus on economic development through urban renewal (e.g., increasing GDP, generating value-added property revenues, and future taxes and fees). In terms of social development, local governments hope to maintain social
stability in the urban renewal process. As for environmental development, the demand of local governments is mainly reflected in the improvement of the living environment.

As an important force in urban economic development, property developers are indispensable stakeholders for urban renewal. The main demand of developers is to achieve the maximum benefit at the lowest cost (e.g., by lowering compensation standards for demolition of buildings and increasing land prices). Developers also have “social” characteristics. They expect not only short-term benefits, but also long-term benefits, such as strengthening their brand power and fulfilling their social responsibilities [33].

The demands of residents are complex and multifaceted. In the process of urban renewal, residents’ places of residence, jobs, and livelihoods may change. In terms of economic development, residents expect corresponding compensation and income gains from land development. In terms of social development, the original social network has been broken; therefore, this group would like to receive employment subsidies and other social security subsidies. In addition, residents expect to actively participate in the urban renewal process to gain their satisfaction and identity [29]. In terms of environmental development, residents hope to improve their living environment and quality of life.

Although designers are not the direct beneficiaries of urban renewal projects, they are important key stakeholders. They are involved in several phases of the renewal project, including planning, decision making, and permit application submission, and thus, they have a major impact on project implementation. They also play an important coordinating role by communicating with local authorities, residents, and developers, seeking the common interests of all stakeholders, and reflecting upon the decisions made after numerous consultations. Designers are mainly employed by local governments and developers. In terms of economic factors, they hope to promote the upgrading and transformation of industries and increase the value of land so that each stakeholder can gain value-added income. At the same time, from a social responsibility perspective, designers also hope that urban renewal projects will protect social neighborhood networks, provide more public facilities and infrastructure, improve environmental quality, and increase land use efficiency.

5.2. Impact of Sustainability Evaluation Indicators

In terms of economic indicators, some previous studies have examined the impact of urban renewal projects on adjustment of regional industrial structure [32,38]. For example, Zheng et al. pointed out that the diversity of business activities was important for economic development. However, others did not choose the adjustment of regional industrial structures as one of their evaluation indicators [33,54,55]. The results of this study show that almost all key stakeholders focus on the adjustment of regional industrial structures, which can promote industrial upgrades and economic recovery. In addition, local governments, developers, and designers are most interested in returns on investments. Both developers and designers focus on the land value growth rate and they expect urban renewal projects to increase the value of their land, such as the assessment of sustainable urban renewal in Addis Ababa, and the evaluation of old community renewal in Nanjing [29,54,56]. However, these gains are not equivalent to the increase in resident income. Our findings show that residents, as well as designers, have special interests in the per capita income growth rate. They want to significantly improve the wage level of residents and employees through urban renewal projects [36]. There are also some differences in terms of stakeholder preferences. Local governments, developers, and designers are more concerned than residents about the amount of investment.

In response to the social indicators, local governments, residents, developers, and designers, all strongly hope that the development and implementation of urban renewal projects can increase employment opportunities in the renewal area [57]. The results are broadly consistent with those of previous studies in Northern Italy and Korea [29,58,59]. The findings also show that public service facilities and safety facilities are important, which is also consistent with previous empirical studies [29,33,60]. Marta and Giulia found that
improving public service facilities can better serve residents and promote sustainable social development [58]. With the rapid economic development of cities and the impact of the new crown epidemic, safety facilities are receiving an increasing amount of attention. At the same time, the findings point out that residents are more concerned about protecting residents’ neighborhoods than the other three stakeholders. They do not want urban renewal projects to damage the social network of the original residents [61]. Local governments and developers place more emphasis on overall satisfaction with urban renewal, and they expect urban renewal projects to bring social benefits and recognition. However, all those stakeholders focus on employment opportunities, public service facilities, safety facilities, and neighborhoods which are closely related to their own interests, while disregarding factors that affect the public interest, such as inheritance of architectural style.

In terms of environmental indicators, local governments as well as residents, developers, and designers recognize that the extent to which urban renewal improves environmental quality significantly affects environmental sustainability; this has been demonstrated in empirical studies of London, Seoul, and Chongqing [62–64]. However, this study examined differences between the attitudes of different stakeholders; this has rarely been examined in previous studies. In addition, local governments and residents agree that the convenience of municipal infrastructure plays an important role in environmental sustainability. On the other hand, developers and designers argue that effective land use space not only avoids wasting land, but it also means more value-added space [65]. Residents and developers believe that improved facility accessibility can contribute to environmentally sustainable development from the user’s perspective [39,66]. However, local governments pay more attention to public transport convenience from the public’s perspective. Moreover, designers are more interested in energy conservation than other stakeholders, which directly affects the environmental quality of the area.

5.3. Application of Sustainability Evaluation Indicators

In this study, the most important factors influencing sustainable urban renewal were examined and their importance was compared from the different perspectives of the various stakeholders. The results form the basis for collaborative decision making processes for urban renewal projects to promote sustainable and inclusive urban renewal. Social and environmental factors should receive as much attention as economic factors. Urban renewal projects should increase public service facilities, safety facilities, and jobs. They must also improve the quality of the urban environment, enhance the quality of life, and promote sustainable environmental development in various ways. For example, the planning and design of urban renewal projects should use green buildings and environmentally friendly materials as much as possible to save energy and achieve carbon peaks.

In addition, the urban renewal strategy must focus on different objectives for different types of urban renewal projects. For example, projects to redevelop old industrial areas focus on promoting industrial upgrading and raising the income level of workers. For urban village redevelopment projects, the goal is to increase property values and improve the living environment. When redeveloping urban villages and residential areas, the protection of residents’ social networks must be strengthened. Moreover, regarding the preservation of historic and cultural neighborhoods, more attention must be paid to public participation and historic preservation to promote sustainable social development.

The results showed that designers’ evaluation preferences are closer to those of the local governments and developers who hired them. However, designers should have a strong sense of social responsibility and should not only serve local governments and developers, but they should also consider the wishes of residents and citizens. They should actively balance the different interests of various stakeholders and become a major driving force in pushing urban renewal toward sustainable development.
6. Conclusions

To achieve sustainable outcomes, continuous and rigorous evaluations of urban renewal initiatives is important. This study examined the influencing factors of sustainable urban renewal from the perspectives of multiple stakeholders, including local governments, residents, developers, and designers. An exploratory SNA-RIM analysis framework was used to measure the evaluation data. The results showed that adjustments to regional industrial structure had the greatest impact on economic sustainability, public service facilities were most important for social sustainability, and environmental qualification improvements had the greatest impact on environmental sustainability. In terms of the preferences of different stakeholders, some influencing factors such as adjustments to the regional industrial structure and the land value growth rate (as economic indicators), employment opportunities and public services facilities (as social indicators), and environmental qualification improvements and greening rates (as environmental indicators) were the most important for all main stakeholders. However, the different stakeholder groups valued some of the indicators differently, such as investment amount (as an economic indicator), protecting residents’ neighborhoods (as a social indicator), and effective land use space (as an environmental indicator).

This study provides more information about the demands and concerns of multiple stakeholders, and it provides useful insights for the design of sustainable urban renewal policies and strategies. In addition, the evaluation of sustainable urban renewal can help stakeholders improve their strategies and solutions and promote collaborative decision-making to achieve successes with sustainable urban renewal. These findings can help urban planners and decision makers balance the needs of different stakeholders and seek common benefits. They can also avoid the costs of managing conflicts to promote making cooperative decisions during complex urban renewal. Factors with high weights should be prioritized in the decision-making process of urban renewal projects. In conclusion, this study can contribute to the improvement of sustainable and inclusive urban renewal strategies and projects. In the future, the proposed SNA-RIM analytical framework will be applied to ongoing urban renewal projects. More stakeholders will be asked to evaluate the sustainability of projects, which can further support the applicability of our model. In addition, more types of secondary stakeholders (such as tenants, NGOs, and citizens) will be considered.

Author Contributions: Conceptualization, Y.B. and S.W.; methodology, Y.B. and S.W.; software, Y.B.; validation, S.W. and Y.Z.; formal analysis, Y.B.; investigation, Y.B.; resources, Y.B.; data curation, Y.B.; writing—original draft preparation, Y.B.; writing—review and editing, S.W. and Y.Z.; visualization, Y.B. and S.W.; supervision, S.W.; project administration, Y.B.; funding acquisition, Y.B. and S.W. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by National Natural Science Foundation of China, grant number 52008130 and 52108023.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable. The future study will also be based on the data.

Acknowledgments: Thanks to S.M. Lo from the Department of Architecture and Civil Engineering, City University of Hong Kong, for his kind help with RIM analysis.

Conflicts of Interest: The authors declare no conflict of interest.

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