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Assessing the complexity of old building renovation and reconstruction projects

Phân tích sự phức tạp của các dự án cải tạo, xây dựng lại chung cư cũ

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ABSTRACT

After prolonged use, old apartment buildings need to be renovated and rebuilt to ensure residents' health and life safety and urban architectural planning. However, these projects contain many complex factors that hinder implementation success. This study explores the factors that cause complexity in projects to renovate and rebuild old apartments. This study presents a list of 12 complexity factors by reviewing previous research. The study surveyed to measure the perceptions of project participants about the complexity of these factors. One hundred sixty-eight valid questionnaires were collected and analyzed using the Relative Importance Index (RII) method. Data analysis showed that the three most complex factors were (1) Ineffective communication between stakeholders exacerbates project complexity, (2) Low community consensus increases the complexity of the project, and (3) Challenges related to compensation and site clearance significantly increase project complexity.

Keywords: Comlexity; site compesation and clearance; old-buildings; renovation; reconstruction.

TÓM TẮT

Trải qua thời gian dài sử dụng, các chung cư cũ cần được cải tạo, xây dựng lại để đảm bảo an toàn sức khỏe, tính mạng của các hộ dân sinh sống cũng như bảo đảm quy hoạch kiến trúc đô thị. Tuy nhiên, các dự án này chứa đựng rất nhiều yếu tố phức tạp, cản trở sự thành công của việc thực hiện. Nghiên cứu này tìm hiểu các yếu tố gây nên sự phức tạp của dự án cải tạo, xây dựng lại chung cư cũ. Thông qua việc tìm hiểu các nghiên cứu trước đây, nghiên cứu này trình bày danh sách 12 yếu tố phức tạp. Nghiên cứu thực hiện khảo sát để đo lường nhận định của những người tham gia các dự án về mức độ phức tạp của các yếu tố này. 168 bảng câu hỏi hợp lệ được thu thập và phân tích bằng phương pháp Chỉ số tầm quan trọng tương đối (Relative Importance Index - RII). Kết quả phân tích dữ liệu chỉ ra 03 yếu tố phức tạp nhất của các dự án này là (1) Giao tiếp không hiệu quả giữa các bên liên quan làm trầm trọng thêm sự phức tạp của dự án; (2) Tỷ lệ đồng thuận của cộng đồng thấp làm tăng tính phức tạp của dự án; và (3) Những thách thức liên quan đến đền bù, giải phóng mặt bằng làm tăng đáng kể độ phức tạp của dự án.

Từ khóa: Sự phức tạp; đền bù giải phóng mặt bằng; chung cư cũ; cải tạo; xây dựng lại.

1. INTRODUCTION

Housing development is a crucial activity contributing to overall societal development. Over time, older apartment buildings need to be rebuilt to ensure the safety and health of residents, as well as to maintain urban architectural planning [1]. According to the Ministry of Construction report, Vietnam currently has over 1 million households residing in 2,500 old apartment blocks constructed before 1994, covering an area of over 3 million square meters, mainly concentrated in large cities.

The research by Nguyen et al. [2] highlighted the prevalent aging situation and severe deterioration of most old apartment buildings in Vietnam's two major cities, Hanoi and Ho Chi Minh City. Ho [3] concluded the degraded state of transportation and technical infrastructure systems in some old apartment complexes in Hanoi. Pham [4] surveyed and identified several realities of old apartment areas, including increased population density compared to the original design, the emergence of unauthorized construction, encroachment on public land, and disrupted architectural spaces.

Localities, especially Ho Chi Minh City and Hanoi, have tried to renovate and rebuild these old apartment buildings. However, the progress achieved has been very low. For example, in 2020, Hanoi had 1,579 old apartment buildings, mostly built between 1960 and 1992. However, over the past 20 years, only about 1.14% of the over 1,500 old apartment buildings have been successfully renovated.

Projects to rebuild old apartment buildings contain many complex factors that affect the progress and success of the projects. Nguyen [5] emphasizes the importance of state management agencies in implementing these projects. However, Thieu [6] believes that the management machinery for these projects needs more professionalism and specialized personnel. Developers often take on the task of connecting stakeholders in the project, leading to delays and affecting the efficiency of the projects. Additionally,

some legal provisions such as "planning must be based on the quality inspection results of the apartment buildings and detailed planning of the 1/500 old apartment complexes approved" or "100% consensus of residents" have slowed down the implementation process of the projects [6].

The complexity of implementing renovation and reconstruction projects for old apartment buildings is a crucial factor causing delays in project execution. However, in-depth research on these complex factors has received little attention from researchers. Therefore, this study focuses on understanding the factors causing the complexity of renovation and reconstruction projects for old apartment buildings. Within the scope of this paper, the results of a broader research project on the complexity of these projects will be presented. Specifically, this paper will present a list of complex factors and rank the importance of these factors.

2. OVERVIEW

According to the Ministry of Construction report, Vietnam currently has over 1 million households living in 2,500 old apartment buildings constructed before 1994, covering an area of over 3 million square meters, mainly concentrated in large cities. Hanoi has approximately 1,579 old apartment buildings, primarily in inner-city districts, built between pre-1954 and 1960-1994 (Plan No. 335/KH-UBND of Hanoi People's Committee). Ho Chi Minh City's Department of Construction statistics indicate 474 old apartment buildings built before 1975. Among these buildings, over 600 are identified as severely deteriorated, primarily concentrated in major cities such as Hanoi (179 buildings), Ho Chi Minh City (130 buildings), Hai Phong (178 buildings), Quang Ninh (46 buildings), and Nghe An (22 buildings).

The existence of these old apartment buildings and the continued residence of people therein pose significant risks and impact the socio-economic management of the area [7]. The water supply and drainage systems, fire protection systems, and technical infrastructure serving these old apartment buildings are prone to degradation and may need to meet current technical standards. Therefore, residents' living quality in these old apartment buildings must be maintained. Moreover, severely deteriorated old apartment buildings are at risk of posing dangerous incidents to the health and lives of residents as well as impacting neighboring areas. Additionally, excessively aged and severely deteriorated old apartment buildings will affect urban planning and architecture [8]. The urban aesthetics and order will be adversely affected, leading to negative impacts on urban development, such as environmental sanitation, fire prevention and fighting, etc.

Therefore, the implementation of rebuilding old apartment buildings is essential. Article 3 of Decree No. 69/2021/ND-CP on the reconstruction of old apartment buildings defines the rebuilding of old apartment buildings as a resettlement project aimed at upgrading quality, expanding area, adjusting the existing area structure of apartment buildings, or demolishing to construct new apartment buildings and other construction works (if any). Regarding construction technicality, old apartment buildings with excessive age, concrete cracking, wall sections, or significant subsidence need a quality inspection. This enables decisions to either allow continued existence through renovation or to require demolition. Regarding socio-economic management, implementing projects to rebuild old apartment buildings beautifies urban aesthetics, stabilizes social order, and promotes economic development [7].

State management agencies have issued many guiding documents, plans, and action programs to implement the reconstruction of old apartment buildings. Since 2009, the government has renovated and reconstructed old apartment buildings according to Resolution No. 34/2007/NQ-CP dated July 3, 2007. This resolution addresses measures to renovate and rebuild old deteriorated apartment buildings, including provisions on preferential mechanisms related to land, finance, and other policies for investors in renovation and reconstruction projects. Following Resolution 34, Government Decree No. 69, dated July 15, 2021, on renovating and reconstructing old apartment buildings also stipulated exemption of land use fees for renovation and reconstruction projects. However, in reality, the Housing Law of 2014 and the Land Law of 2013 do not have specific provisions regarding land use fee exemptions for these projects. This has made it difficult to carry out procedures related to land use fee exemptions for these projects.

Implementing projects to rebuild old apartment buildings faces difficulties and delays. The execution of these projects is confronted with numerous complex factors. As a result, only 3% of the planned reconstruction of old apartment buildings has been achieved by 2021. Many projects are halted at the surveying stage.

The complexity of implementing these projects is increasing. Technical factors (such as construction organization plans, machinery usage, etc.), organizational factors (such as human resources management, information exchange system management, etc.), and environmental factors (such as political, social, etc.) are becoming more complex. Past research has highlighted the causal relationship between project complexity, implementation results, and project success [9]. Specifically, minimizing project complexity leads to better implementation results and project success. Therefore, understanding the project's complexity to propose methods to reduce complexity is crucial in project management.

3. RESEARCH METHODOLOGY

This research employs a combined approach of qualitative and quantitative research methods [10]. Firstly, a list of complex factors in renovating and reconstructing old apartment buildings is identified through a comprehensive review of previous studies on such projects in Vietnam and worldwide. Table 1 lists 12 complex factors associated with renovating and reconstructing old apartment buildings in Vietnam.

After that, a survey questionnaire was developed to understand the perceptions of those involved in implementing these projects regarding the complexity of the factors under the conditions in Vietnam. The questionnaire was designed to elicit responses from participants using a 5-point Likert scale. The survey process yielded 168 completed questionnaires for analysis.

Among the respondents, 42 individuals had 1-5 years of experience in the construction industry. There were 71 individuals (42% of the total) with 6-10 years of experience and 55 individuals (33%) with over ten years of experience. The majority of survey participants worked in construction companies (50%), followed by consulting firms (21%), state management agencies (17%), and investors (13%).

The collected data was analyzed using the Relative Importance Index (RII) method. This approach has been proven effective in ranking factors in previous literature. For instance, Ezeokoli et al. [11] applied RII to measure the importance of digital transformation

factors in Nigeria. Alemayehu et al. [12] used the RII method to rank barriers to BIM adoption in Ethiopia.

Table 1. Complexity factors of renovating and reconstructing old apartment buildings

No.	Complexity factors
1	Urban planning contributes to increasing the complexity of the project.
2	Legal requirements for 100% community consensus will further complicate the project.
3	Complex administrative procedures are the leading cause of project complexity.
4	Insufficient government budget poses challenges and complicates the project.
5	Lack of experience among project stakeholders contributes to project complexity.
6	Difficulty in accessing funds is a significant factor in project complexity.
7	Uncertainty about economic feasibility is a factor that complicates the project.
8	Long project duration significantly increases project complexity.
9	Challenges related to compensation and land clearance significantly escalate the project's complexity.
10	Dissatisfaction with resettlement areas contributes to project complexity.
11	Low community consensus increases the complexity of the project.
12	Ineffective communication among relevant parties exacerbates the complexity of the project.

The formula for calculating the RII is defined as follows [12]:

$$RII = \frac{\sum(Wix\ Ri)}{NxM}$$

Where:

RII represents the Relative Importance Index of each factor.

Wi denotes the weight of each response level (from 1 to 5) for each factor.

Ri indicates the number of respondents at response level i for each factor.

N is the total number of survey participants.

M is the number of response levels (in this case, 5)

4. DATA ANALYSIS AND DISCUSSIONS

Table 2 illustrates the ranking results of the relative importance levels of complex factors in the renovation and reconstruction projects of old apartment buildings using the RII method.

The analysis results indicate that the top three most complex factors in implementing renovation and reconstruction projects of old apartment buildings in Vietnam are: (1) Ineffective communication among relevant parties exacerbates the complexity of the project, (2) Low community consensus increases the complexity of the project, and (3) Challenges related to compensation and land clearance significantly escalate the project's complexity.

In Vietnam, ineffective communication among relevant parties significantly exacerbates the complexity of old building renovation and reconstruction projects. Firstly, misunderstandings arising from unclear project objectives and requirements due to inadequate communication can lead to disagreements and delays in decision-making. With a shared understanding of goals and expectations, stakeholders may pursue divergent paths, resulting in clarity and inefficiencies. Secondly, a lack of trust and transparency in communication further complicates matters. When stakeholders perceive communication as opaque or biased, they may resist cooperation, hindering collaboration efforts and impeding progress. Additionally, incomplete or inaccurate information exchange can result in uninformed decision-making and suboptimal project outcomes. Thirdly, differences in language and communication styles among stakeholders pose a significant challenge. Vietnam's diverse cultural landscape means that communication norms can vary widely between parties, leading to misunderstandings, misinterpretations, and conflicts. This cultural barrier can impede effective collaboration and coordination efforts, contributing to project delays and cost overruns. Furthermore, ineffective communication undermines stakeholder engagement and buy-in. When parties feel unheard or marginalized, they are less likely to participate in project initiatives or support project goals actively. This lack of engagement can further hinder progress and exacerbate project complexity.

Table 2. Prioritization of complexity factors

No.	Complexity factors	RII value	Rank
1	Urban planning contributes to increasing the complexity of the project.	0.749	6
2	Legal requirements for 100% community consensus will further complicate the project.	0.740	8
3	Complex administrative procedures are the leading cause of project complexity.	0.748	7
4	Insufficient government budget poses challenges and complicates the project.	0.720	12
5	Lack of experience among project stakeholders contributes to project complexity.	0.751	5
6	Difficulty in accessing funds is a significant factor in project complexity.	0.730	11
7	Uncertainty about economic feasibility is a factor that complicates the project.	0.739	10
8	Long project duration significantly increases project complexity.	0.757	4
9	Challenges related to compensation and land clearance significantly escalate the project's complexity.	0.771	3
10	Dissatisfaction with resettlement areas contributes to project complexity.	0.739	9
11	Low community consensus increases the complexity of the project	0.775	2
12	Ineffective communication among relevant parties exacerbates the complexity of the project.	0.781	1

Low community consensus significantly increases the complexity of Vietnam's old building renovation and reconstruction projects. Firstly, decision-making processes become challenging when community members lack agreement or consensus regarding the project objectives, scope, or design. Disagreements over critical aspects of the project can lead to delays, conflicts, and even legal disputes, hindering progress and increasing project costs. Secondly,

low community consensus can impede stakeholder engagement and cooperation. When community members are not actively involved in the decision-making process or feel their voices are not heard, they may become resistant to project initiatives or even oppose them altogether. This lack of support from the community can create additional hurdles for project implementation and exacerbate complexity. Thirdly, inadequate community consensus can lead to mistrust and social tensions. In Vietnam, where communal values and solidarity are highly valued, discord within the community can have far-reaching consequences. Social conflicts arising from disagreements over project implementation can strain relationships, undermine social cohesion, and damage the reputation of project stakeholders, further complicating efforts to move the project forward. Moreover, low community consensus may result in regulatory challenges and delays in obtaining necessary approvals and permits. Government agencies and regulatory bodies may hesitate to endorse projects lacking community support or face significant opposition, leading to bureaucratic hurdles and extended project timelines.

Compensation and land clearance challenges present formidable obstacles to old-building renovation and reconstruction projects in Vietnam, considerably escalating their complexity. Firstly, land acquisition and clearance often encounter legal, logistical, and bureaucratic hurdles. Vietnam's intricate land ownership structure and stringent compensation regulations contribute to the complexity. Disputes may arise over land valuation, ownership rights, and compensation amounts, leading to prolonged negotiations, delays, and increased project costs. Secondly, resistance from affected communities and property owners adds another layer of complexity. Displacement and resettlement issues are susceptible, often triggering social tensions, protests, and legal disputes. Communities may resist relocation, demand higher compensation, or challenge the legitimacy of land acquisition, further complicating the clearance process and impeding project progress. Thirdly, inadequate financial resources allocated for compensation exacerbate the challenges. Delays in disbursing compensation payments may escalate grievances and fuel opposition, prolonging the clearance process and delaying project timelines.

5. CONCLUSIONS

Renovating and rebuilding old apartment buildings is an urgent issue. However, these projects involve numerous complex factors that hinder their successful implementation. This study presented a list of 12 complex factors affecting old-building renovation and reconstruction projects in Vietnam. Data analysis revealed the three most complex factors of these projects to be (1) Ineffective communication among relevant parties exacerbates the complexity of the project, (2) Low community consensus increases the complexity of the project, and (3) Challenges related to compensation and land clearance significantly escalate the project's complexity. Additionally, the three least complex factors identified were (1) Uncertainty about economic feasibility is a factor that complicates the project; (2) Difficulty in accessing funds is a significant factor in project complexity; and (3) Insufficient government budget poses challenges and complicates the project.

Although the research questions have been addressed, some key issues must be noted and serve as gaps for future studies. Firstly, complexity is defined as the multidimensional relationship among factors within the research system. Studying complexity should consider the relationship among the 12 complex factors in implementing old-building renovation and reconstruction projects. However, the RII method did not assess the relationship among these complex factors. Therefore, future studies must use other methods (such as DERMATEL, DANP, etc.) to analyze the project's complexity. Additionally, this research was conducted in the context of Vietnam, and the results presented may not apply to other countries worldwide. Therefore, further studies could be undertaken to assess the level of complexity of old building renovation and reconstruction projects in different geographical contexts.

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