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Proposed Treatment Strategies for Aging Residential Complexes: Zayouna Residential Complex in Baghdad as a Case Study.

استراتيجيات المعالجة المقترحة للمجمعات السكنية الشائخة: مجمع عمارات زيونة السكني في بغداد كحالة دراسية.

Thanaa Hussein Rudaini [a *], Rana Mazin Mahdi [a]

[a] Department of Architectural Engineering, University of Technology- Iraq, Baghdad, Iraq.

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K E Y W O R D S

Aging, Curative Strategies, Old Residential Complexes, Swot, Gis, Baghdad.

A B S T R A C T

The rapid development of residential complexes and the renovation of aging areas have become urgent issues in contemporary communities. The complexes built in the 1980s are gradually deteriorating and showing signs of aging, making it challenging to meet residents' needs. This study aims to clarify proactive and curative scenarios for dealing with the aging of residential complexes through treatment strategies and define strategies and mechanisms to be followed according to time frames. This article analyzes the Zayouna Residential Complex in Baghdad as a case study of physical aging, supported by field surveys and interviews. It includes a SWOT matrix and a Geographic Information System (GIS) analysis to evaluate the current condition of the complex and assess the impact of interventions. This paper provides a reference for planning the renewal of aging residential complexes, emphasizing proactive and curative strategies. It concludes that effective treatment scenarios are essential for mitigating the effects of aging and preventing further deterioration, ultimately fostering a community and an economically sustainable living environment.

الكلمات المفتاحية

الشيخوخة، الاستراتيجيات العلاجية، المجمعات السكنية القديمة، تحليل (SOWT)، نظم المعلومات الجغرافية، بغداد.

الملخص

في الآونة الأخيرة تطورت عمليات بناء المجمعات السكنية بسرعة وأصبحت عملية تجديد المناطق السكنية القديمة تدريجيا قضية ملحة في المجتمعات الحالية. المجمعات السكنية التي بنيت في الثمانينات تتدهور تدريجيا وتعاني من شيخوخة، وتتزايد الاحتياجات المختلفة للسكان وتتعارض مع البيئة المعيشية المتداعية، وهذا يتطلب التدخل اللازم لتحسين المجمعات القديمة لتواكب تطورات العصر واحتياجاتهم. الهدف من البحث: لتوضيح مؤشرات واسباب الشيخوخة، وتوضيح الاستراتيجيات اللازمة لمعالجتها على المدى القريب والبعيد. تناولت هذه المقالة مجمع عمارات زيونة السكني في بغداد كحالة دراسية محلية، الذي يعاني من شيخوخة مادية واضحة بصريا من خلال المسوحات الميدانية والمقابلات، وتقديم مصفوفة SOWT بالإضافة الى التحليل باستخدام نظم المعلومات الجغرافية GIS لواقع حال المجمع وبعد اجراء المعالجة، حيث توفر هذه الورقة مرجعا محددا لتخطيط تجديد المجمعات السكنية الشائخة. وتركز على الاستراتيجيات المتبعة لمعالجة شيخوخة المجمعات السكنية استباقياً وعلاجياً، فخلص البحث الى دور السيناريوهات العلاجية الفعالة (الاستباقية والعلاجية) في التقليل من اثار الشيخوخة ومنع تفاقمها على المدى القصير والبعيد مما يوفر بيئة سكنية مستدامة اجتماعيا واقتصادياً.

* Correspondent Author contact: ae.21.02@grad.uotechnology.edu.iq
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1. Introduction

In recent years, rapid urbanization and economic development have led to rising costs for new housing construction, while living standards have also improved. This has highlighted issues related to aging residential environments. Residential complexes built in the 1980s are deteriorating and showing signs of aging, making them less able to meet residents' needs, especially regarding open outdoor spaces essential for psychological comfort and recreation. (Ma Yixuan, 2018). The renewal process of aging residential complexes is often difficult due to the many economic and social aspects of the residents, contractors and entrepreneurs. Therefore, improving the current state of old residential environments has become an important issue that requires immediate intervention. The role of proactive and curative strategies in addressing aging residential complexes remains unclear, particularly in terms of their specific timeframes.

This paper emphasizes the urgent need to improve aging residential environments, specifically by enhancing open outdoor spaces for activities within these complexes. It addresses green areas, recreational facilities, parking, and circulation pathways. The proposed treatment strategies for mitigating aging effects can be applied at both macro and micro levels in the short and long term. The focus will be on the physical aspects to extend the residential complex's lifespan, meet residents' daily needs, enhance social interaction, and ultimately improve their quality of life. Through field research conducted in the residential complex, including interviews and observations of daily life, this study explores the impact of aging on residents, particularly focusing on open spaces. This serves as a starting point for investigating treatment strategies and contributing to theoretical research that can be used as a reference for improving residential environments in the near and distant future. The Zayouna Residential Complex in the Al-Muthanna neighbourhood of Baghdad was chosen for this study because it is one of the oldest model residential complexes. It exhibits signs of aging from a lack of regular maintenance and effective management, leading to residents abandoning their homes, negatively impacting their social and economic lives, and altering their lifestyles. The study will review the literature on aging, its causes, and global treatment methods. It will focus on renewal strategies as a proactive approach for the short term and a restructuring strategy for a long-term curative approach. Additionally, treatment scenarios that include practical applications and design suggestions for both proactive and curative interventions for treatment aging will be proposed. It aims to clarify proactive and curative scenarios for dealing with the aging of residential complexes through treatment strategies and define strategies and mechanisms to be followed according to time frames.

2. Research Methodology

The research methodology was based on:

- Combining information from the actual state of the residential complex, as reflected by the required physical, cognitive, and geographical data, with a qualitative approach based on theoretical knowledge gathered from earlier investigations. A variety of techniques were employed, such as field visits, observations, taking pictures to understand better the behaviours related to the phenomenon, conducting interviews with complex residents to gather descriptive data, online research, accessing academic databases, and visiting relevant government departments. The complex's physical components, state, and usability, were examined to assess physical aging. Neglect, inadequate management, maintenance concerns, and the complex's lack of urban management were among the flaws that were detected.
- The analytical approach involved using a Geographic Information System (GIS) program to more clearly analyze and comprehend the current state of the built environment, including land uses, movement axes and entrances, and green and recreational spaces, and measuring their ratios before and after treatment.

A proactive keeping scenario based on a short-term renewal strategy and a curative restructuring scenario based on a long-term curative restructuring strategy were among the suggested treatment options. Two ideas for restructuring scenarios were made: one to enhance the economic aspects and the other to enhance the social side. A survey of the most significant housing constructions completed in Baghdad over a period extending 20-30 years allowed for the spatial, functional, and technological identification of the deteriorating complex. Given that it was one of the oldest model residential complexes in Baghdad at the time, suffering from obvious physical aging of its various components and in urgent need of intervention,

the projects on both sides (Karkh-Rusafa) were chosen because, at the time, they were among the oldest model residential complexes in Baghdad. They were in dire need of intervention because they were among the oldest complexes that were most impacted and deteriorating in terms of urban, architectural, social, and economic aspects. Its significance in the Al-Muthanna neighbourhood (Zayouna area), Additionally, it can be explained in several ways:

- Diagnosis stage: Researchers assessed the complex's current conditions to identify issues and diagnosed various aging indicators linked to neglect, poor maintenance, and lack of urban management. A database was created, revealing that the complex's aging condition is mild based on evaluating its elements, physical state, and usage efficiency.
- Analysis stage: A SWOT analysis was conducted to identify the residential complex's strengths and weaknesses. A reality assessment using the Geographic Information System (GIS) was also performed to measure aging indicators and propose suitable strategies for treating them.

Development and Recommendation stage: Design scenarios are presented to treat the complex's aging condition, emphasizing the need for proactive measures to prevent further deterioration. Additionally, curative scenarios are proposed as plans for managing the complex as it transitions into advanced aging stages.

3. Materials

3.1. Aging of Residential Complexes

It is defined as the deteriorating and unsuitable living conditions manifested in three dimensions: physical, economic, and social, which negatively reflect on the current residential complexes, causing a lack of balance and social justice in the urban and residential environment (B. O. M. A. Ibrahim Jawad Al Youssef, 2015) It is defined as a decline in old residential systems, rendering them unfit for use and unable to meet current functions. This leads to decreased usability and resident abandonment. The decline is influenced by reduced benefits, technological advancements, and changing user preferences (Dandan, 2021). There is a possible loss in the value of residential properties due to reduced functionality due to deterioration, damage, technological or environmental changes, and shifts in human behaviour and preferences (Reed and Warren-Myers, 2010). It is a dynamic phenomenon affecting residential systems, requiring interventions like demolition, replacement, or revitalization due to its significant threats and social and cultural consequences. It indicates the conclusion of their physical and economic lifespan, which affects their performance and contributes to gradual deterioration. This emphasizes the essential role of maintenance and renewal in prolonging the life of this system (Thomsen and Van Der Flier, 2011). It affects older residential assets that have diminished in utility due to the impact of environmental changes and flexibility at both the macro and micro levels, which can respond to adaptive reuse or modernization modifications (Grover and Grover, 2015). Jacobs described it as "slow death", which affects all levels of the residential fabric, leading to complete decay; its effects are visible in neglected spaces, abandoned areas, and dilapidated buildings, resulting in decreased economic value, higher abandonment rates, crime, and insecurity in neighbourhoods, causing deterioration of the living environment and social cohesion, ultimately reducing property values (Power and Mumford, 1999). They exhibit characteristics such as difficulty accessing services, a lack of green and recreational spaces, transportation issues, deteriorating infrastructure, aging residential buildings, obstacles on pathways, and poor urban furniture. Additionally, there is a lack of designated areas for pedestrians and individuals with special needs (Dandan, 2021). It affects elements of the residential environment, including entrances to residential complexes, road networks, parking areas, public facilities, and open green spaces.(Mareeva et al., 2022).

3.2. Causes of Aging That Prompt Interventions

Each residential complex has a unique demographic trajectory, social fluctuations, and physical transformations, requiring an examination of these aspects. This includes analyzing population characteristics, building patterns, connectivity to the city, and available services to identify common causes of aging, such as social issues like poverty, unemployment, insecurity, and the economic challenges faced by residents. (Meda, 2017). Physical factors such as inadequate usage and maintenance, poor accessibility, and insufficient equipment and services contribute to the situation. The intervention aims to rectify the

processes of physical deterioration and their associated social and economic impacts (Díaz Gómez et al., 2019).

3.3. Global Strategies for Remediation Residential Environment Aging

This section outlines treatment strategies, highlights the renewal strategy that focuses on revitalizing integrated communities with the participation of investors and residents, and urban restructuring that involves various physical interventions within the residential fabric while also emphasizing social and economic elements. (Díaz Gómez et al., 2019). The different global methods for the treatment of aging will be studied, aimed at enhancing the renewal process based on global experiences (Carmon, 2001). In Hong Kong, design factors are considered essential for sustainable urban renewal (Deng, Chan and Poon, 2016). In Singapore, the focus is primarily on developing existing public housing to achieve more sustainable living (Teo and Lin, 2011). In Germany, there is an emphasis on developing affordable housing in brownfield sites and using models of public intervention.(Priemus and Metselaar, 1993). Austria applies the "soft urban renewal" model, which aims to develop affordable housing in mixed-use locations to enhance and renew the current urban environment. (Huber, 2011). In the United States, the goal of renewal is to transform large-scale public housing sites into smaller, mixed-income projects, primarily relying on the private sector (Shach-Pinsly et al., 2021).

According to an analysis of previous studies, the renewal strategy represents short-term interventions, whereas the restructuring strategy and comprehensive interventions indicate long-term interventions.

3.4. Renewal Strategy

Currently, a large portion of the residential buildings are old (50–70 years old) and do not meet current construction requirements (such as building materials, small apartment sizes, infrastructure systems, etc.); thus, many of these neighbourhoods need to go through a process of urban renewal to provide higher quality for residents (Carmon, 1998). Current urban renewal strategies relate mainly to improving buildings, infilling new buildings within existing urban construction, demolishing old buildings, constructing new buildings, and integrating diverse communities into deteriorated locations (Carmon, 2001). A review of the existing literature led to a set of definitions for renewal, defined as an integrated vision focused on the treatment of urban and housing issues; it aims for continuous improvement through various partial or comprehensive interventions in the physical, social, environmental, and economic conditions of areas that have experienced change (Peter Roberts, 1999). It is a process of renovating and adapting aging residential systems to contemporary needs, evaluating residential components based on spatial requirements within a defined timeframe for implementation (Kharofa, 2014). It is defined as the physical alteration of residential environment components to attract various economic and social activities. This involves utilizing available economic and technical resources to gradually replace outdated structures and facilities that do not align with contemporary needs in response to economic, social, and urban changes (Abd Al-Khalidy, 2022). It aims to restore damaged residential fabrics, stimulate economic growth, and enhance the sense of place attachment to reduce social inequality, thereby increasing social cohesion (Rahman, 2020). Achieved by a set of context locally designed strategies to renovate economic activity, restore social functions or integration, and achieve environmental balance (Campos-Medina et al., 2013). By improving infrastructure and services and renewing other components, a suitable living environment can be fostered. This approach treats social, physical, security, safety, and environmental pollution issues. Consequently, residential complex renewal projects can enhance living conditions in the residential environment following the residents' needs (Mareeva et al., 2022). It is based on a set of mechanisms that include:

- Improvement and Partial Demolition: Through immediate interventions based on the needs of various site components and gradual replacement that involves the removal of blocks to allow for new users or the creation of new streets and pedestrian pathways through the existing blocks (GROUPE VALOPHIS, 2012).
- Renewal of Existing Buildings: focuses on retaining and rehabilitating existing structures for preventive maintenance, including systematic repairs, structural safety improvements, and open space enhancement. It also involves installing staircases and elevators in appropriate locations(Nowogońska, 2019).

- Improvement in Accessibility in Outdoor Public Spaces: This involves adding escalators and ramps, as well as removing architectural barriers to enhance accessibility (Díaz Gómez et al., 2019).

It is noted from the above that the renewal strategy includes short-term partial interventions in the residential environment, focusing on the restoration of aging-impact fabric.

3.5. Urban Restructuring

The process of moving from an outdated structure to a new one, known as restructuring, is defined as a vital step through which the system seeks to address contemporary crises involving geographical location changes that significantly impact the urban environment. These changes are responded to through interventions that contribute to improving the quality of life and providing a suitable environment for residents.(Logan and Swanstrom, 2005). It is defined as a series of procedures aimed at significant qualitative enhancement in residential complexes, which includes functional improvements and housing conditions to enhance the building's image by increasing the surface area of houses, restructuring their typology, and expanding or adding new movement units. Urban restructuring interventions involve modifications to the existing structure through complete demolition and replacement of residential fabric components, introducing new uses, improving infrastructure, and numerous social and economic initiatives that focus on enhancing prospects and social cohesion (Díaz Gómez et al., 2019), as the diagram shows in Figure (1).

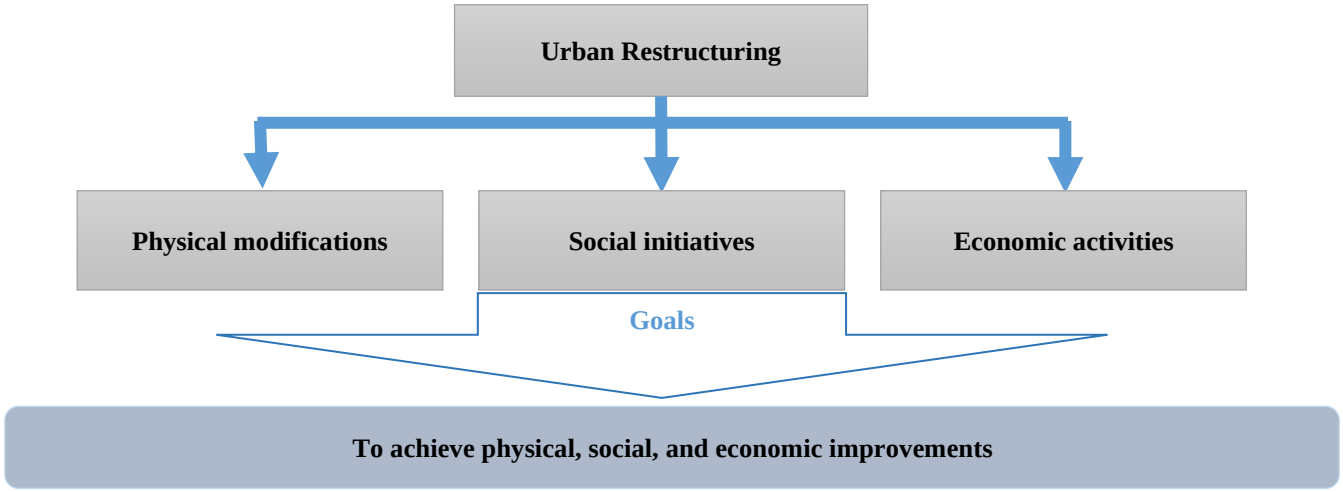

Figure 1: Urban Restructuring prospects and goal, Source: Authors depending on (Díaz Gómez et al., 2019).

Involves a set of mechanisms, including (Díaz Gómez et al., 2019)

- Residential Restructuring through Complete Demolition and Replacement: This aims for significant improvements by restructuring housing to enhance functionality, living conditions, and the building's appearance. The main objectives include improving quality of life, increasing new uses, and redistributing space, with a focus on enhancing both housing and shared areas of buildings to benefit users.
- Volume Additions: This involves incorporating new housing styles of different heights and introducing new activities to integrate various uses or types of housing while adapting to the existing residential layout.

It is noted from the above that restructuring involves comprehensive interventions in the aging residential environment to treat long-term issues. Therefore, the research assumes that integrating renewal and restructuring strategies can effectively address the aging of residential complexes by treating the damaged residential fabrics. These strategies operate on both comprehensive and partial levels, improving and restoring the affected fabric, as shown in Table (1).

Table 1: Different Aspects of Strategies, Source: Authors depending on previous literature.

Strategy	Physical Aspects	Social Aspects	Economic Aspects
Renewal (Short-term)	Improving the residential fabric	Increase in social cohesion	Revitalization of economic growth

	Improving the infrastructure and services	A sense of belonging	Attracting various economic activities
		Security and safety	Using available resources and technologies
	Accessibility improvements in open spaces	Improving living conditions	Effective land use
Urban Restructuring (Long-term)	Restructuring existing buildings	Activating social initiatives and programs	Increasing the number of floors to enhance the value of residential properties
	Routine maintenance work	Enhancing social relationships through urban design	Introducing new uses
	Improving structural safety		
	Complete demolition and replacement to introduce new uses		
	Residential restructuring, improving open spaces between buildings		
	Functional improvements		

4. Case Study

The Zayouna Residential Complex is located east of Baghdad in the Rusafa district's Al-Muthanna neighbourhood. Constructed during the 1980s, the estate has 153 residential structures and was regarded as one of the top model communities of that period. Eighty-six three-story buildings and 67 five-story structures make up its division. The complex features one of the largest markets in the Middle East, known as the "Central Tuesday Market," which was converted into military barracks after the occupation of Baghdad in 2003 and remains abandoned. The Iraqi Ministry of Housing constructed the complex with assistance from Dutch and French companies. Its residents are a mix of Muslim and Christian communities, with many Christians having emigrated due to sectarian violence following the occupation, leading to a decline in the social and service conditions within the complex due to neglect and demographic changes. Additionally, the complex includes a swimming pool and a community centre that later transformed into private shops, as well as schools, an institute, a mosque, and a police station (Wikimedia, 2023); see Figure (2).

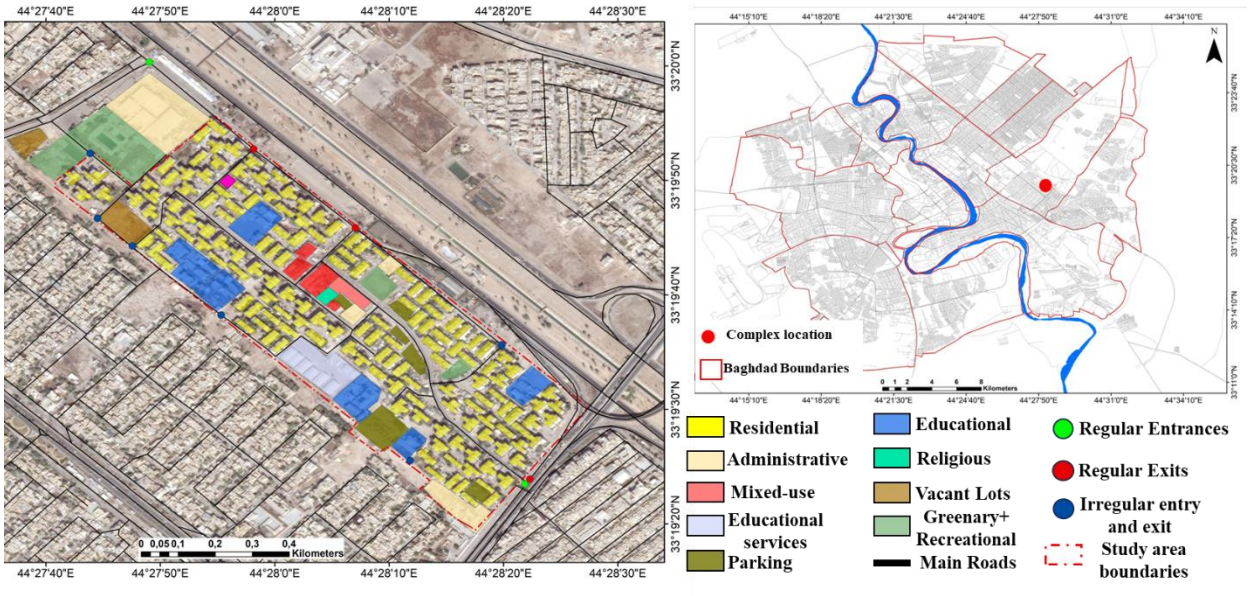

Figure 2: Existing Land Use map of the study area for the year 2024, Source: Author, using data from field surveys and GIS version 10.8.2.

The complex has various uses, with residential use houses, commercial activities, markets, and educational, health, recreational, administrative, and service functions. It also has public parking areas, buildings-related parking, and a police station. The complex is aging and has deteriorating residential buildings, requiring urgent remediation. The internal street network is chaotic and a mix of pedestrian and vehicular traffic, with random uncontrolled entrances, no clear boundaries between buildings and roads, cars often parked on the deteriorating sidewalks, poorly designed parking, and a lack of green areas and trees. This negatively impacts public safety and security. Additionally, there is a shortage of green spaces and vacant lots and poor waste management, affecting the residential environment. These issues need urgent intervention for remediation, see Figure (3).

Figure 3: The current state of the study area for the year 2024. Source: Authors using data from field surveys and GIS version 10.8.2, photos by iPhone 14 Pro Max.

The current state of the complex has been studied to assess aging indicators and present a SWOT analysis to identify the complex's strengths, weaknesses, opportunities, and threats.

4.1. Strategic Analysis by SWOT Matrix

The SWOT analysis is a strategic analysis method that identifies internal and external factors affecting the scenario development in the study area. It aims to identify strengths, weaknesses, opportunities, and threats (Nutt and Backoff, 1993). The results are illustrated in a diagram, see Figure (4).

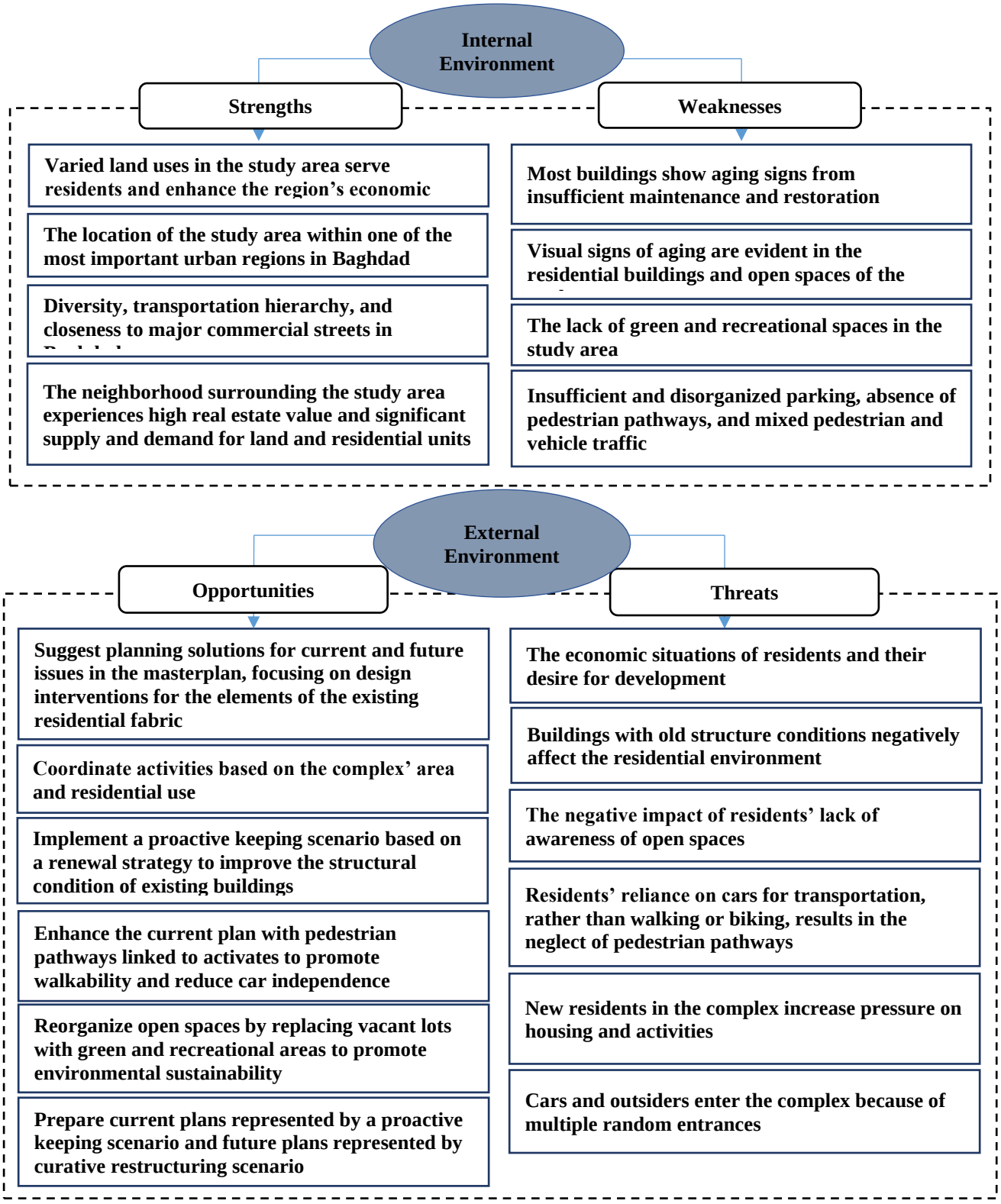

Figure 4: SWOT Analysis of the case study (Source: Authors).

4.2. Scenarios

Two treatment scenarios have been presented, including the Proactive Keeping Scenario and the Curative Restructuring Scenario, which focuses on social and economic aspects. These scenarios have been analyzed using Geographic Information System GIS. Notably, the proposed scenarios do not involve changes to the main axes of the complex or the public, commercial, and service buildings.

Proactive Keeping Scenario: Sustainable partial interventions in the residential fabric of the complex have been implemented as part of a renewal strategy to preserve the existing structure while introducing

new activities. These partial interventions include the partial demolition of two residential buildings, the conversion of vacant lots into green spaces, and the use of schoolyards as green areas for social interaction after school hours, redefining the areas of open space between residential buildings, using tiny, well-designed, and dynamic plazas; and adding new playgrounds in schoolyards and key squares. Other measures include the installation of lifts and stairs in suitable locations, renewing facades with sustainable materials, redesigning and redistributing green spaces, parking areas, and movement pathways, including pedestrian and bicycle networks; installing directional road signs; and utilizing green spaces for recreational purposes. Additionally, rest areas and kiosks will be placed parallel to pedestrian pathways to enhance the living environment and redefine open spaces between residential buildings (W. W. Nasser and R. M. Mahdi, 2023); see Figure (5).

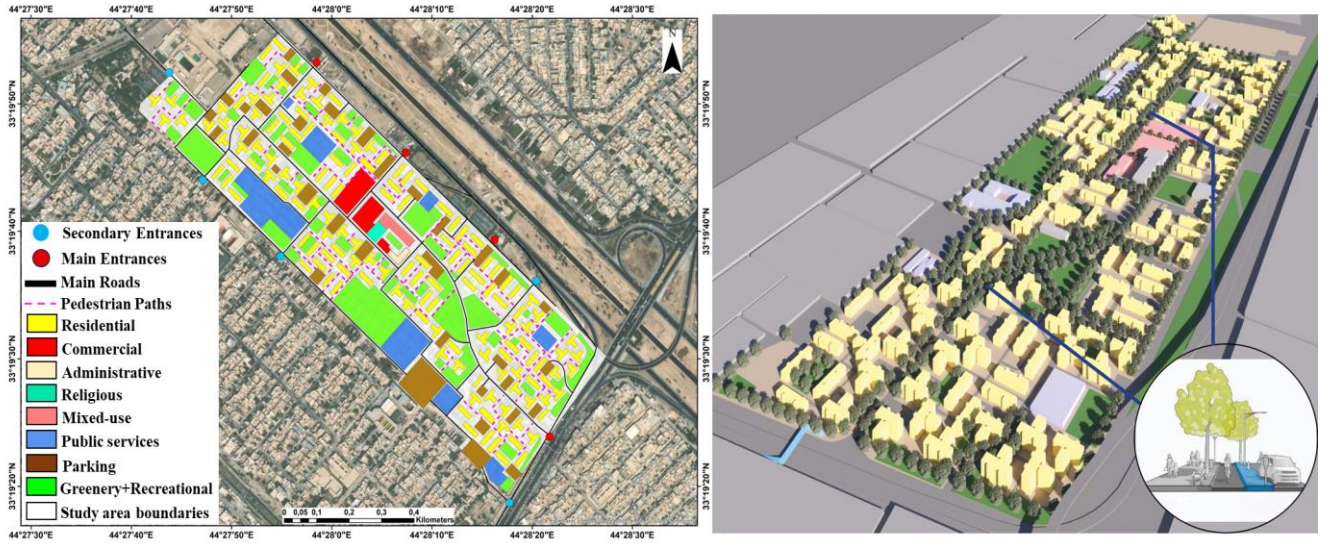

Figure 5: Proactive Keeping Proposal for treatment aging, Source: Authors, using data from field surveys and GIS version 10.8.2, 3ds Max.

Curative Restructuring Scenario: a series of procedures, including full demolition and extensive restructuring of the complex with new uses and activities that enhance various functions, are recommended based on a curative restructuring plan for the residential fabric at the macro level. Two models have been proposed. The first one is to enhance the social aspect through a residential restructuring in an urban way that encourages social interaction. This model aims to improve living conditions for residents and promote social cohesion and a sense of belonging, and it depends on intentionally planned open spaces between the buildings to support social cohesiveness. The proposal has 48 residential buildings, such as tower structures with seven floors and 103 residential buildings constructed in an "L" shape with five floors. It strongly emphasized green areas and opportunities for social contact, classifying them as public, semi-public, and semi-private areas. A central plaza is also designed as a social interaction area. Vehicle traffic is routed along the site's borders, and an extensive pedestrian network is incorporated inside the complex to promote walkability. This creates a sustainable road network that separates pedestrian activity from automobile traffic. In addition, it includes both public and underground parking, see Figure (6).

The other proposal is a curative restructuring scenario aimed at enhancing the economic aspects of the effective urban restructuring of residential buildings to increase the financial value of the complex, given that it is situated in one of the most desirable and costly locations in Baghdad. This scenario includes 22 residential buildings shaped like a "U" shape with seven floors distributed along both sides of the main axis of the complex, along with 46 residential buildings with ten floors.

A comprehensive, connected, and landscape pedestrian network is implemented, allowing vehicular access within the complex; multi-story public parking facilities surround the complex; underground parking will be available near the main entrances; green and recreational spaces, classified into public, semi-public, and semi-private areas, are designed; and designed plazas are created for a variety of transient and permanent commercial activities for the complex's residents. Moreover, commercial uses are introduced in the complex's centre to enhance its economic potential further, see Figure (6).

The decisions made in the proposed scenarios are up to the actors represented by the top-down and bottom-up approaches, with the participation of the residents based on development visions. The Proactive Keeping scenario depends on individual renovations of the buildings, and the buildings that have been removed will have their residents compensated. The Restructuring scenario involves a comprehensive plan with one or several investors, and residents are compensated financially or provided with alternative housing in another area according to state policies.

Figure 6: Curative Restructuring Proposal-Social, Source: Authors, using data from field surveys and GIS version 10.8.2.

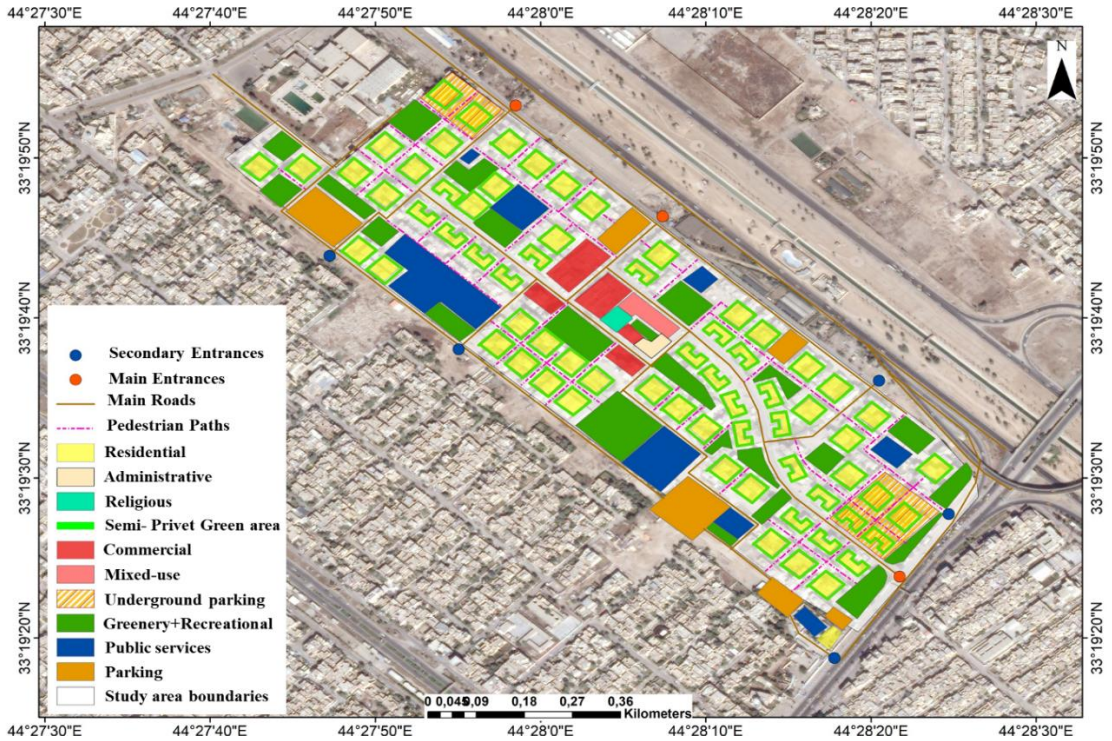

Figure 7: Curative Restructuring Proposal-Economic, Source: Authors, using data from field surveys and GIS version 10.8.2.

5. Analysis and Results

According to the SWOT analysis, the proposal alternatives are evaluated based on the land use area index for each model to measure the quality and efficacy of the residential environment inside the complex, comparing them to the current situation. The complexes' outside areas and green spaces are the main focus of this study.

5.1. Areas Analysis

Within the boundaries of the study area, which is estimated to cover an area of 47.92 hectares, as shown in Table (2), the proportion of various land uses, including residential, commercial, health, educational, mixed-use, religious, administrative, parking, green and recreational spaces, transportation, and vacant lots will be measured.

Table 2: Land Use Area Proportions for the Current Situation and Proactive and Curative Scenarios, Source: Authors depending on data from GIS.

Land Use Type	Current situation (%)	Proactive Keeping Scenario (%)	Curative Restructuring Scenario	
			Social	Economic
Residential+Green belt	25.74%	25.05%	15.91%	16.69%
Commercial	1.73%	2.04%	3.98%	3.44%
Administrative	7.80%	0.27%	0.27%	0.27%
Religious	0.25%	0.25%	0.25%	0.25%
Public Services	11.5%1	7.28%	6.97%	8.89%
Greenary+Recreational	1.35%	10.28%	16.27%	13%
Parking	3.42%	8.29%	10.45% With underground	11.56%
Vacant lots	1.53%	/	/	/
Transportation+Pedestrian	45.90%	45.90%	45.90%	45.90%
Complex Total Area	100%			

6. Discussion

By comparing the proportions of land area in the proactive and curative scenarios, it was found that:

- Compared to the current situation, where vacant lots make up 1.53% of the complex's total area, the Proactive Keeping Scenario sees a rise in the percentage of open spaces to 10.28%. Furthermore, parking spots that were randomly arranged were transformed into green areas, increasing the number of landscape places. The green areas were arranged in linked groups to function as hubs for social interaction during diverse events. After school hours, schoolyards can be used to enhance land usage. In addition, the Ministry of Education's educational services assigned as storage areas have been transformed into green spaces for the complex's recreation. After the renovation, the percentage of parking spaces went from 3.42% in the existing condition to 8.29%. The citizens' awareness of and involvement in the revitalization process is crucial to the success of this scenario. Notably, services were consistently maintained across all models due to their effective distribution within the complex. Figure (8) shows the percentage.
- Under the Curative Restructuring Scenario designed to improve the social aspect, the proportion of open outdoor spaces rose from 1.35% to 16.27%. This is in line with promoting sociability and familiarity. Also, the percentage of parking spaces increased to 10.45% from 3.42% earlier.
- In the restructuring intended to increase the economic aspect, the proportion of green areas is 13%, while parking spaces now make up approximately 11.56% of the complex's overall area. Figure (9) shows these percentages.

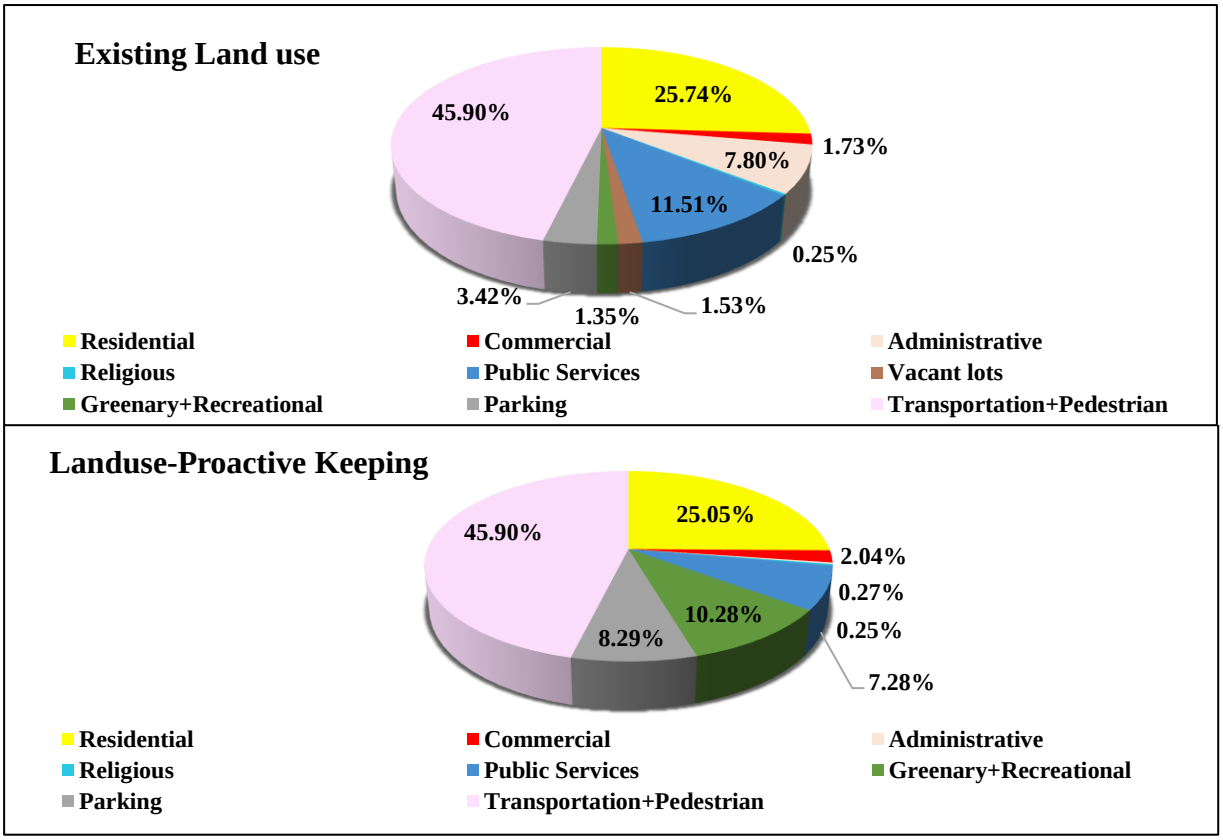

Figure 8: Comparison of Land Use Proportions Between Current Situation and Proactive Keeping Scenario, Source: Authors depending on data from GIS.

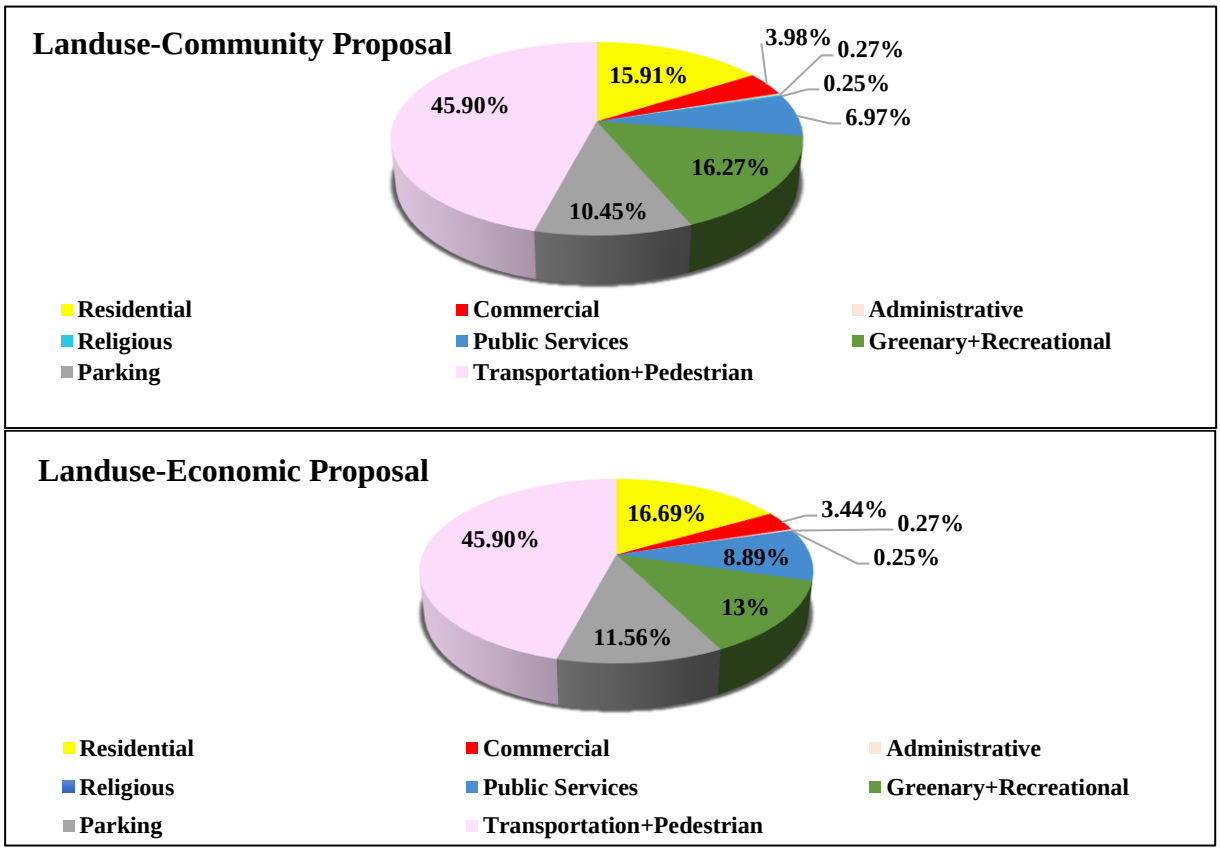

Figure 9: Land Use Proportions of Curative Restructuring Scenarios, Source: Authors depending on data from GIS.

7. Conclusions

- Aging can be defined as a dynamic and continuously evolving phenomenon that manifests in both material and immaterial patterns at macro and micro levels. This occurs as an inevitable result in various components of old residential fabrics, environments, and systems due to several factors, including neglect, lack of maintenance, functional decline, obsolescence, deterioration, damage, technological and environmental changes, as well as shifts in human behaviour and misuse of spaces. Such conditions necessitate appropriate interventions through proactive strategies, such as renewal, aimed at extending the lifespan of the residential system, and curative strategies, such as restructuring, which involve partial or full demolition and replacement.
- The goal of treatment aging lies in improving housing conditions and the quality of the residential environment within complexes. This includes enhancing and diversifying land uses, increasing green spaces, and improving housing to impact users positively. In addition, the objectives encompass social and economic goals aimed at improving prospects and fostering familiarity and residential integration.
- The Proactive Keeping Scenario, based on a renewal strategy, represents an initial step to address the aging of the residential complex in the short term, aimed at maintaining the residential structure, extending its lifespan, preventing further deterioration, and creating a suitable and sustainable living environment. In contrast, the Curative Restructuring Scenario aimed at enhancing social and economic aspects represents long-term plans that will represent the next step executed when aging becomes more severe and reaches an advanced stage. Thus, by integrating these strategies, the aging of residential complexes can be effectively addressed, as they operate on both macro and micro levels to restore the damaged fabric of the community.

8. Recommendations

- Before starting to create models to address the aging of residential complexes, designers and planners should consider the opportunities and challenges that the SWOT analysis method presents, along with the residential complex's primary strengths and weaknesses.
- The strategies adopted to address the aging of residential complexes must be designed according to several determinants, including urban development programs of the local government and the specific local context. Each location has its unique characteristics, which vary across different environments. Furthermore, each strategy has its particularities and objectives tailored to local contexts, thereby promoting sustainable urban development.

References

Abd Al-Khalidy, Q.M. (2022) 'Methods of urban renewal of the Architectural Heritage Urban legacies case study in the town of Zubair', Hawlyat Al-Montada, 1(51). Available at: https://www.iasj.net/iasj/article/252730

B. O. M. A. Ibrahim Jawad Al Youssef (2015) 'Urban upgrading of the deteriorating residential environment: An evaluation of the experience of urban upgrading projects in the city of Baghdad', J. Archit. Plan., 27, n, pp. 1–33.

Campos-Medina, F. et al. (2013) 'Regeneración urbana en Chile y Cataluña. Análisis de estrategias en fases de diseño e implementación', Cuadernos de Vivienda y Urbanismo, 2(4). Available at: https://revistas.javeriana.edu.co/index.php/cvyu/article/view/5515/

Carmon, N. (1998) 'Immigrants as carriers of urban regeneration: International evidence and an Israeli case study', International Planning Studies, 3(2), pp. 207–225.

Carmon, N. (2001) 'Housing policy in Israel: Review, evaluation and lessons', Israel Affairs, 7(4), pp. 181–208.

Dandan, F. (2021) 'Research on aging in place demand elements in China's old city regeneration', J. Civ. Eng. Archit, 15, pp. 469–474. Available at: https://doi.org/10.17265/1934-7359/2021.09.003

Deng, Y., Chan, E.H.W. and Poon, S.W. (2016) 'Challenge-driven design for public housing: The case of

Hong Kong', Frontiers of Architectural Research, 5(2), pp. 213–224.

Díaz Gómez, C. et al. (2019) 'Intervenciones de rehabilitación en grandes conjuntos habitacionales construidos durante el periodo 1950-1975', ACE: Architecture, city and Environment, 14(41), pp. 11–34. Available at: https://doi.org/10.5821/ace.14.41.6538

GROUPE VALOPHIS (2012) Rénovation urbaine du quartier des Navigateurs 2012-2016. Available at: https://www.groupevalophis.fr/videos/renovation-urbaine-du-quartier-des-navigateurs-2012-2016?page=1 (Accessed: 10 September 2023).

Grover, R. and Grover, C. (2015) 'Obsolescence–a cause for concern?', Journal of Property Investment & Finance, 33(3), pp. 299–314. Available at: https://doi.org/10.1108/JPIF-02-2015-0016

Huber, F.J. (2011) 'Sensitive urban renewal or gentrification? The case of the Karmeliterviertel in Vienna', in Everyday life in the segmented city. Emerald Group Publishing Limited, pp. 223–239.

Kharofa, D.O.H. (2014) 'Urban Renewal Policies According to Sustainability Methods Evaluating Of Traditional Cities, Mosul City As A Sample', Al-Qadisiya Journal for Engineering Sciences, 7(3), pp. a105–a133. Available at: https://www.iasj.net/iasj/article/92569

Logan, J.R. and Swanstrom, T. (2005) 'Urban restructuring: a critical view', Cities and society, pp. 28–42.

Ma Yixuan (2018) 'Research on the renovation of outdoor activity spaces in old residential areas in Beijing under the concept of healthy housing(Chinese)'. 北方工业大学.

Mareeva, V.M. et al. (2022) 'Sustainable Urban Regeneration of Blighted Neighborhoods: The Case of Al Ghanim Neighborhood, Doha, Qatar', Sustainability, 14(12), p. 6963.

Meda, J.B. (2017) 'La dimensión económica de la exclusión residencial: Cataluña en el contexto europeo', ACE: Arquitectura, Ciudad y Entorno [Preprint]. Available at: https://doi.org/10.5821/ace.12.34.4695

Nowogońska, B. (2019) 'Diagnoses in the aging process of residential buildings constructed using traditional technology', Buildings. Available at: https://doi.org/10.3390/buildings9050126

Nutt, P.C. and Backoff, R.W. (1993) 'Transforming public organizations with strategic management and strategic leadership', Journal of Management, 19(2), pp. 299–347. Available at: https://doi.org/10.1016/0149-2063(93)90056-S

Peter Roberts, H.S. (ed.) (1999) Urban Regeneration: A Handbook. SAGE Publications Ltd.

Power, A. and Mumford, K. (1999) The slow death of great cities?: urban abandonment or urban renaissance. York Publishing Services-Joseph Rowntree Foundation.

Priemus, H. and Metselaar, G. (1993) 'Urban renewal policy in a European perspective', Netherlands Journal of Housing and the Built Environment, pp. 447–470.

Rahman, M. (2020) Prospects and Possibilities of Sustainable Urban Revitalization: Considering and Reviewing the Boro Bazaar area with the Context of Khulna City, Bangladesh. Università degli Studi di Palermo. Available at: https://hdl.handle.net/20.500.14242/84428

Reed, R. and Warren-Myers, G. (2010) 'Is sustainability the 4th form of obsolescence', in InPacific Rim Real Estate Society 16th Annual Conference, pp. 1–16.

Shach-Pinsly, D. et al. (2021) 'Multiparametric analysis of urban environmental quality for estimating neighborhood renewal alternatives', Urban Planning, 6(4), pp. 172–188. Available at: https://doi.org/10.17645/up.v6i4.4405

Teo, E.A.L. and Lin, G. (2011) 'Determination of strategic adaptation actions for public housing in Singapore', Building and Environment, 46(7), pp. 1480–1488.

Thomsen, A. and Van Der Flier, K. (2011) 'Understanding obsolescence: A conceptual model for buildings.', Building Research and Information, pp. 352–362. Available at: https://doi.org/10.1080/09613218.2011.576328

W. W. Nasser and R. M. Mahdi (2023) 'The Role of Connectivity and Integration in Cultivating Attractive Values: A Space Syntax Study of Al-Amal Housing Project, Basra.', International Journal of Sustainable Development and Planning, Vol. 18, N, pp. 2847–2859. Available at: https://doi.org/https://doi.org/10.18280/ijsdp.180923

Wikimedia (2023) Zayouna Residential Neighborhood. Available at: https://ar.wikipedia.org/wiki/زيونة (Accessed: 15 November 2023).