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Quality Assessment of Residential Complexes Standards of Satisfaction in Basra City of Iraq

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ABSTRACT

The purpose of this study is to assess the planning and design of residential communities in the Iraqi city of Basra through residential standards set by the Iraqi Ministry of Housing to determine the residents' level of satisfaction. Residential complexes implemented in the city of Basra lack planning and building design standards in order to be residential complexes that meet the needs of their residents and achieve a level of satisfaction for them. Due to the large number of defined criteria, three groups of criteria were established: residential (local) planning indicators, social services indicators, and dwelling unit design indicators through the method of comparing the reality indicators of these complexes of housing with the standard. Specific criteria on selected residential communities in the city of Basra were evaluated as well as differences in planning and design style to test and evaluate residential standards. The study provides recommendations to the future that could help this city and others become friendlier and more sustainable.

1. INTRODUCTION

There is a need to consider the extent to which residential complexes in Basra meet the satisfaction of their residents and provide modern housing. A residence should provide adequate physical infrastructure and social amenity services in planned, decent, safe, and hygienic neighborhoods to meet the essential and unique needs of the population [1]. Housing is a basic human requirement, regardless of socio-economic status, as it forms the foundation of family life [2]. It is vital for survival, protecting individuals against harsh weather conditions and other external factors [3].

Despite its importance, the designs of residential complexes in Basra often fail to provide the necessary social services and utilities for worthy living [4, 5]. To bridge the gap between reality and standards, it is important to understand that a residence is a composite commodity that fulfills several human needs. While its main function is to provide a dwelling, it also serves as a social space for interaction and socialization with family and friends or to reach the desired level of socialization [6]. From a social perspective, a residence offers more than just a dwelling unit and its characteristics. It also provides health services, security, privacy, neighborhood and social relations, community facilities and services, access to jobs, and control over the environment. The absence of any of these dimensions can cause significant harm [7].

2. LITERATURE REVIEW

2.1 Residential complexes quality and user satisfaction

Residential satisfaction defined as the feeling of satisfaction when one has or achieves what one needs or desires in a home and a family evaluates a neighborhood based on the following normative criteria:

•Area should be predominately residential,
•Accessible to quality schools,
•Quality of streets and roads,
•Homogeneity regarding social class, race, and ethic [8].

A residence quality assessment provides essential information on the current state of the residence stock and can be used as input for future projects and insight into users' current wishes and needs. Most research on dwelling quality is based on user satisfaction [9]. Residential satisfaction is defined as the gap between a respondent's needs and aspirations and the reality of the current residential context [10].

A residential area represents a particular land use where the dwelling factor is dominant, unlike industrial and commercial areas. In recent years, people have been more interested in moving to urban residential areas for which the satisfaction level has become a key factor for the suitability of the residents [11]. The user's concern with the residential environment continues to be the focus in the appraisal of the affinity between humans and their dwelling environment [12].

The residential satisfaction also depends on the cultural norms of the residents, irrespective of the physical quantity or quality of their inhabited residence. These norms are the pivotal determining factors of residential satisfaction. The first relates to the residential physical features necessary to meet residential satisfaction. The second denotes the features of neighborhood quality. The third corresponds to the types of ownership, the fourth implies the expendable dwelling costs, and the fifth represents the proximity of residential location to other public facilities, workplaces, or kin/relative's house to meet their daily needs [13, 14].

Satisfaction assessments are often required to determine the

propriety of a residence environment for user prospects, needs, and goals. Any assessment we consider on a grand scale is determinant in user satisfaction. In other words, people's responses to the environment they live in reflect user's satisfaction in the residence environment. The term environment is related not only to the physical components of residence environment consisting of residential, development of the dwelling area, and neighborhood, but also to social and economic (arrangement and institutions) conditions. If good techniques are used in data gathering and analyses, it is possible to measure physical, social, and arrangement factors that determine the level of user satisfaction in the dwelling area. This information can be used not only for specifying user responses to the environment but also for developing the current dwelling area features, its design, and characteristics of new arrangements to be made [15].

In a behavior sense, user's satisfaction in residential should be defined as a reliant attitude toward a habitation environment [16]. When different components of attitude (informational, emotional, and behavioral) are considered, some researchers prefer a definition of emotional components for defining user satisfaction in residential, while others prefer perception-based definitions [16]. In the definitions to which emotional component is important, user satisfaction in residential means reflecting the feelings of satisfaction and happiness to the residential place which also creates these feelings [17, 18]. In the definitions to which informational component is important, user satisfaction in residential is founded by the correspondence between the present conditions of the users and the criteria they expect and demand [19-21]. In the informational approach, it is suggested that if the gap between demands and needs decreases, residential area user satisfaction increases [22].

Residential quality is a broad term that encompasses many aspects and has both an objective and a subjective dimension. The objective dimension consists of many aspects of particular significance; examples include dwelling type, number of rooms, presence of facilities, and the condition of the dwelling [23]. The individual dimension includes useful features that lead to specific needs, desires, and prospects. In short, residential quality criteria include residential conditions such as the characteristics or properties of a physical environment and the characteristics of its users [24].

Sustainable Development Goal 11 posits making human settlements sustainable. This incontestably means that urban residential and residential quality issues are very important issues to be considered. The major determinants of urban residential quality are the age of the dwelling, the types of building, and the materials used in their construction [25]. Neighborhood satisfaction and residential satisfaction will contribute to future research on urban quality of life [26]. Livability could be described as the quality of the person-environment relationship or how well the built environment and the available services fulfill the residents' needs and expectations [27, 28].

2.2 Residential complexes layout of urban planning

It is difficult to find out a comprehensive definition for urban and 'every country defines urban independently' Often, definitions of urbanization involve one or more of the following characteristics; managerial, economic, population related standards, and urban standards related to the functional nature of urban locations. As an alternative to managerial definitions for urban areas, other definitions are based on population mass, population density, economic jobs, availability of specific infrastructure, and availability of sure services [11]. The architecture and urban planning Layout refer to the physical arrangement of urban spatial components at different scales, in a creative and functionally reasonable way [29]. residential community layout planning plays a linking role between floor layout and urban planning. However, the actual work cannot be carried out broadly due to the absence of a large-scale, dependable, and open-source standard dataset. Exactly, current work on the automatic reproductive residential layout and design mainly relies on rule-based methods [30-34].

3. RESIDENTIAL CRITERIA

The Public Authority for Residential is the sectoral body responsible for residential in Iraq and implements the general policy for residential and securing adequate residential for citizens. This Residential criterion includes the main planning standards for residential complexes It is necessary for planners and designers to note that these standards are just a tool or one of the keys to designing solutions. The designer should choose only the basic and most relevant and technically appropriate items for the project in order to develop solutions and alternatives that he finds. The prevailing trends of city planning were based on the neighborhood unit with a central service center as its nucleus, then other trends emerged based on the strip distribution of services so that it overlaps with the collecting system of dwelling units and in a way that allows the economic, social and cultural activities of the neighborhood unit to remain continuous and vital. It is called the neighborhood unit the residential neighborhood depends on three elements: the number of family members, the number of residents, and the number of dwelling units. By assembling four residential shops (neighborhood units), the residential neighborhood is formed, and by assembling four residential neighborhoods. Planning standards aim to organize the special determinants of Residential communities represented by the residential neighborhood, the residential neighborhood and public social services according to the gradation of the size of the population centers and the open areas according to the gradation of the population centers and age groups. And the pattern of dwelling (horizontal or vertical) according to the residential density and depending on the organizational decisions based on the basic design of the city [35].

4. CASE STUDY

Three Residential complexes have been selected in the city of Basrah different in terms of planning and design style to test and evaluate the Residential standards on them and to know the extent to which the axes of Residential standards were achieved. The analytical aspect was adopted through the on-site visit to the three residential complexes and the analysis of the site design plans to reach the conclusions of the results of the analysis in comparison with the Residential standards Figure 1.

Figure 1. Residential complexes in Basrah city (Google Earth)

4.1 Al-Andalus city complex

It is located in the city of Basra, Abu Al-Khasib district Figures 2, 3. It consists of a mixed pattern of horizontal dwelling units (476) and verticality (348) with the site area about 25 hectares to occupy a population size (4,944) people as shown in Table 1.

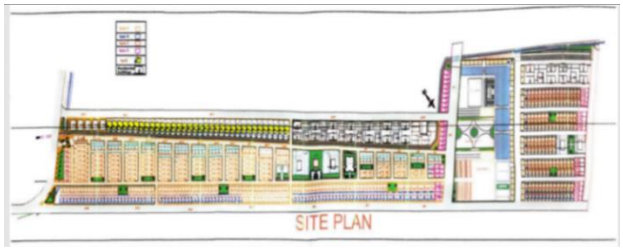

Figure 2. Master plan of Al-Andalus City complex (By author)

Figure 3. Al-Andalus City complex buildings (By author)

4.2 Al-Safaa residential complex

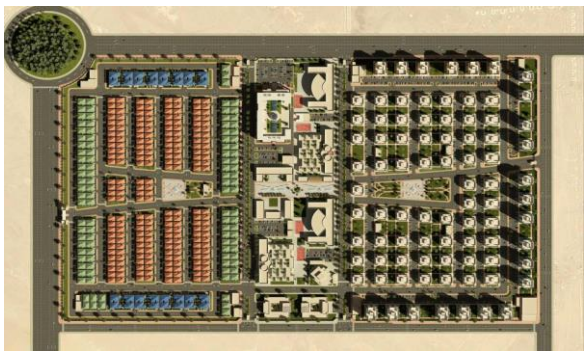

Figure 4. Master plan of Al-Safaa residential complex (By author)

It is located on the banks of the Basra Shatt, adjacent to the road linking Basra Airport and the Sports City (Figure 4). It consists of a mixed pattern of horizontal (354) and vertical (1,468) dwelling units and an area of 50 hectares to occupy a population size 11142 people. As shown in Table 1.

4.3 Basrah modern complex

It is located near the Sports City in Basra (Figure 5). It consists of a mixed pattern of horizontal (606) and vertical (780) dwelling units and an area of 47.5 hectares to occupy a population size of 8,316 people as shown in Table 1.

Figure 5. Master plan of Basra modern complex (By author)

5. RESULT AND DISCUSSION

5.1 The number of residential units

The number of residential units in the three residential communities did not meet the residential standards for the residential locality represented by (400-600) residential units, as it did not depend on a standard within the residential requirements and standards They are closer to the standards of the residential neighborhood and they cannot be considered residential neighborhoods because the requirements of the residential neighborhood of the social and public services of the residential neighborhood are not met, as shown in Table 1 and Figure 6.

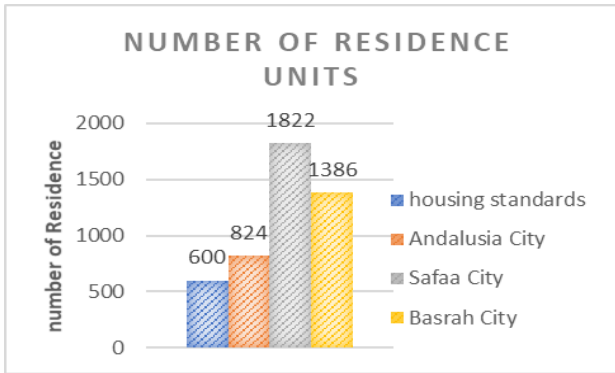

Figure 6. Number of residence unit's indicators

5.2 Size of the residential complex

It is clear that the average size of the three residential complexes in terms of population number exceeds the population of the residential standards of the residential neighborhood, which ranges from (2,400-3,600). people, they did not depend on a standard within the requirements and standards of residential as shown in Table 1 and Figure 7.

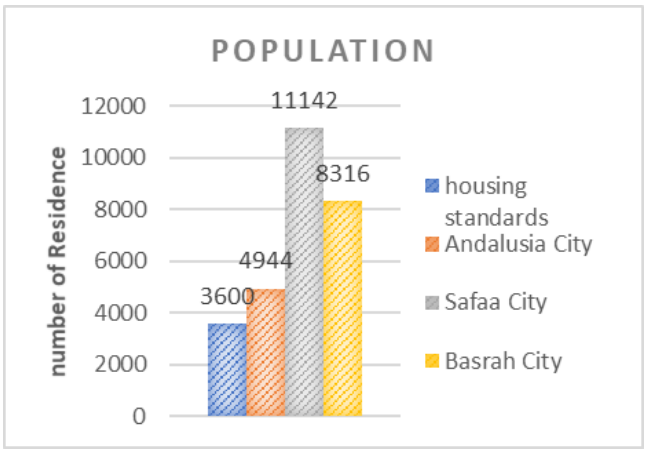

Figure 7. Number of populations

5.3 Residential density

Which represents the number of residential units within the area, the Andalus city complex achieved the residential density standard for horizontal dwelling, but it did not achieve the standard for vertical dwelling, while the Al-Safaa residential complex approached the standard for horizontal dwelling by a little less than the standard and did not meet the standard for vertical dwelling. As for the Basra residential complex, the residential densities were Within the residential density standard for both horizontal and vertical dwelling, as shown in the Table 1.

5.4 Population density

It represents the population within the area. The complexes of Al-Andalus and Al-Safah city achieved the criterion of population density for horizontal dwelling, but they did not meet the criterion for vertical dwelling, while the Basra residential complex achieved the residential criterion for population density for both horizontal and vertical dwelling, as shown in the Table 1.

6. PLANNING INDICATORS FOR SOCIAL SERVICES

6.1 Nursery building

The Andalus complex did not have a building for a nursery in, while in the other two communities (Basrah city and Safaa city) despite the provision of nursery buildings, it did not achieve the required space standard according to the size of the population compared to residential standards, as shown in the Table 2 and Figures 8, 9.

6.2 Kindergarten building

The kindergarten buildings were allocated in all dwelling projects, but they did not meet the standard of the required area according to the size of the population compared to the requirements of the residential standards. but there is a closeness to the area standard for complex of the city of Basra, as shown in the Table 2 and Figures 10, 11, 12.

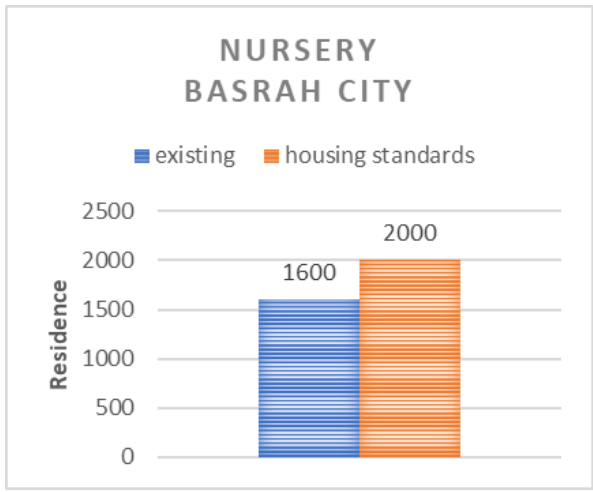

Figure 8. Nursery indicators area in Basrah city

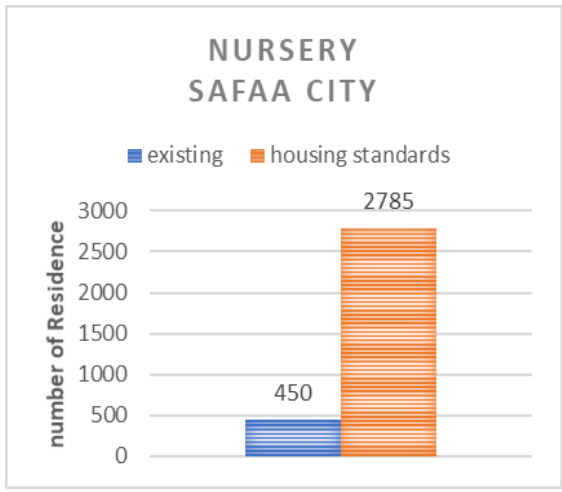

Figure 9. Nursery indicators area in Safaa city

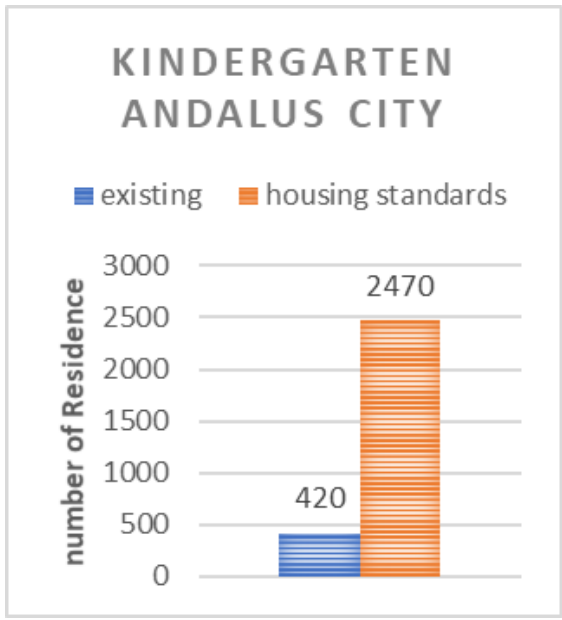

Figure 10. Kindergarten indicators area in Andalus city

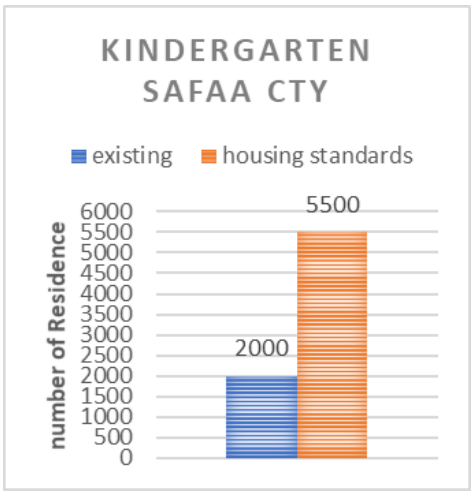

Figure 11. Kindergarten indicators area in Safaa city

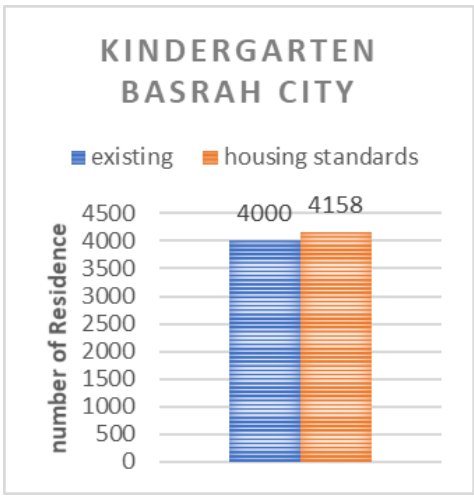

Figure 12. Kindergarten indicators area in Basrah city

6.3 Primary school building

The primary school buildings were allocated for the age groups (6-12) years in all residential projects, but they did not meet the standard of the required area according to the size of the population compared to the requirements of residential standards, as shown in the Table 2 and Figures 13, 14, 15.

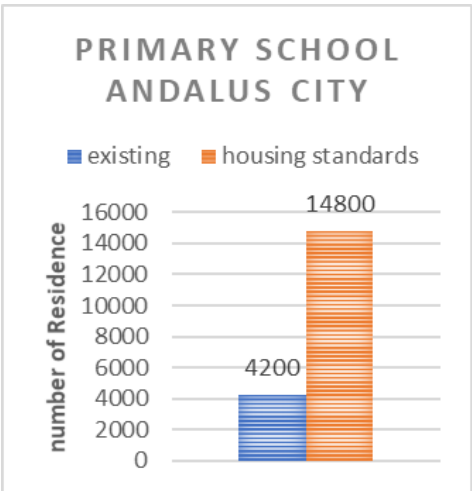

Figure 13. Primary school indicators area in Andalus city

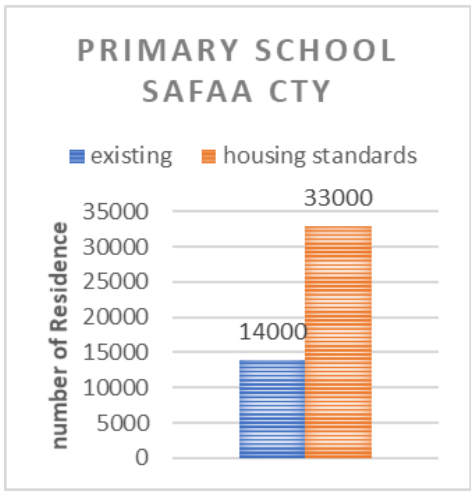

Figure 14. Primary school indicators area in Safaa city

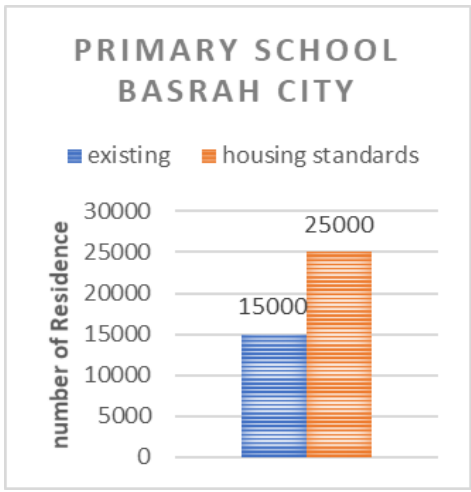

Figure 15. Primary school indicators area in Basrah city

6.4 Secondary school building

The secondary school buildings were allocated for age groups (13-18) years in all residential projects, but they did not meet the required area standard according to the size of the population compared to the requirements of residential standards, as shown in the Table 2 and Figures 16, 17, 18.

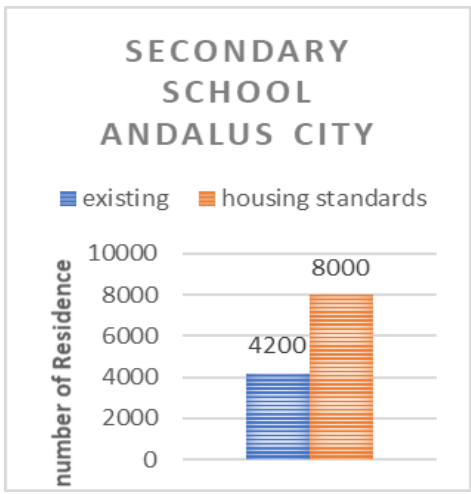

Figure 16. Secondary school indicators area in Andalus city

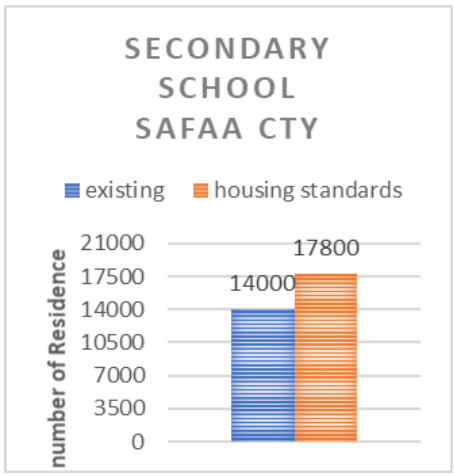

Figure 17. Secondary school indicators area in Safaa city

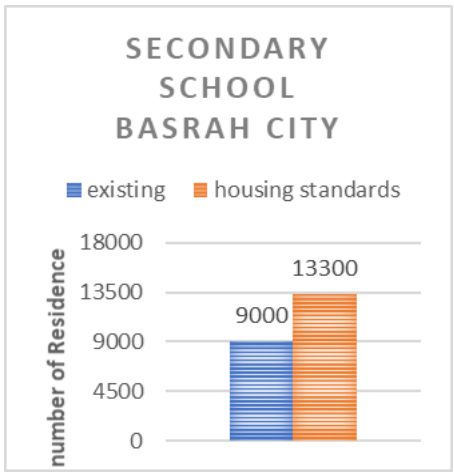

Figure 18. Secondary school indicators area in Basrah city

6.5 The health center (clinic) building

The health center buildings were allocated in all residential projects, but they did not achieve the required space standard for the two city complexes (Al-Safah - Basra) according to the size of the population compared to the requirements of the residential standards, while the Andalusian city project complex was the space allocated for the building higher than the allocated space standard According to population size, as shown in Table 2 and Figures 19, 20, 21.

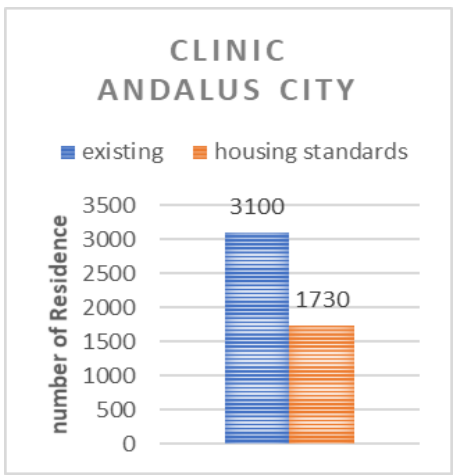

Figure 19. Clinic indicators area in Andalus city

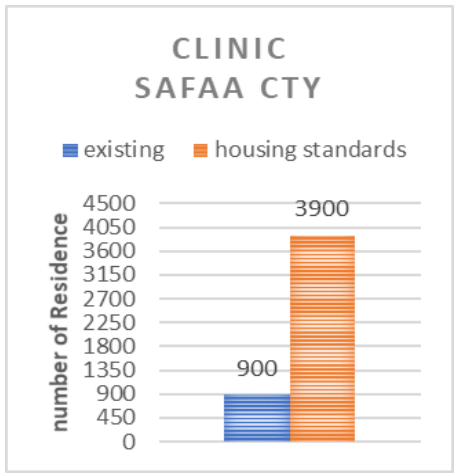

Figure 20. Clinic indicators area in Safaa city

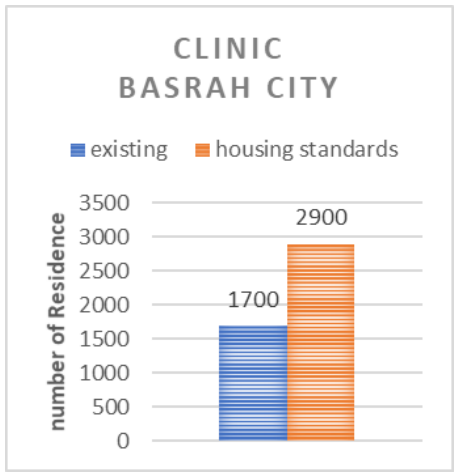

Figure 21. Clinic indicators area in Basrah city

6.6 Mosque building

A building was allocated for the mosque in all residential projects, with areas exceeding the area allocated to them for the two complex of (Andalus.-Al-Safaa) according to the residential standards in relation to the size of the population, except for the Basra city residential complex , which was less than the area allocated to it, as shown in the Table 2 and Figures 22, 23, 24.

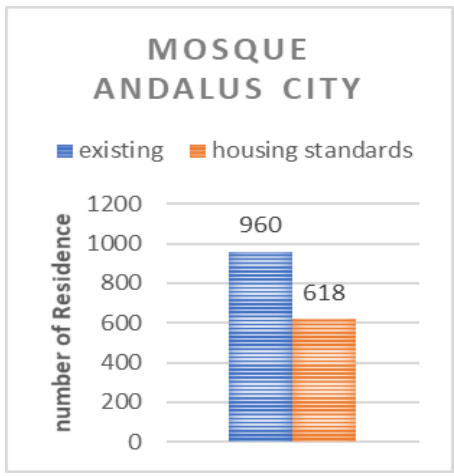

Figure 22. Mosque indicators area in Andalus city

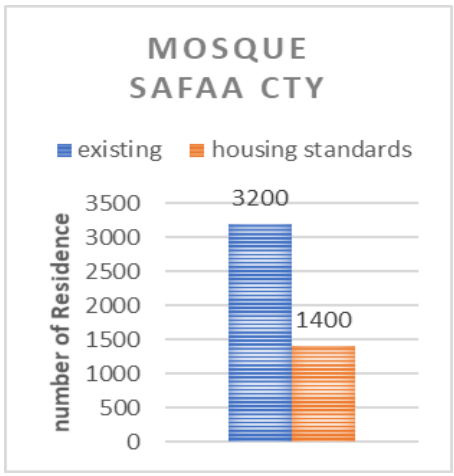

Figure 23. Mosque indicators area in Safaa city

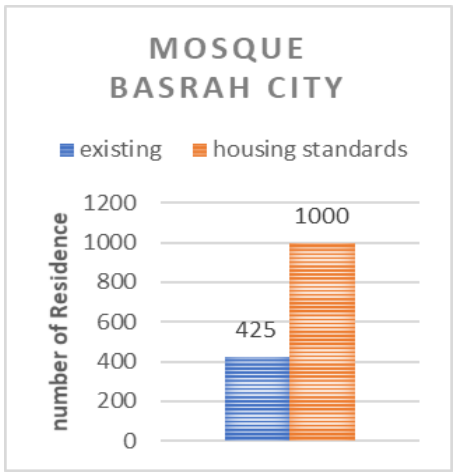

Figure 24. Mosque indicators area in Basrah city

6.7 Local markets building

The markets building was allocated to serve the residents of residential communities in all residential projects, and there was no shortage of spaces allocated for the two complex (Andalus–Basra) according to the requirements of residential standards, while the Al-Safaa City project complex were less than the standard of the area allocated for a building the markets according to the size of the population, as shown in Table 2 and Figures 25, 26, 27.

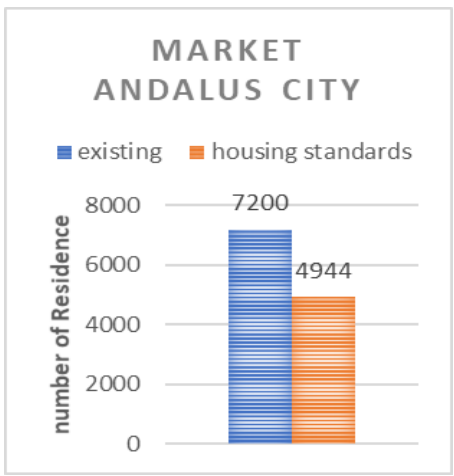

Figure 25. Markets indicators area in Andalus city

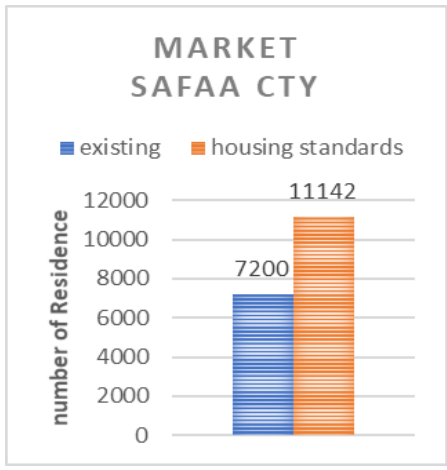

Figure 26. Markets indicators area in Safaa city

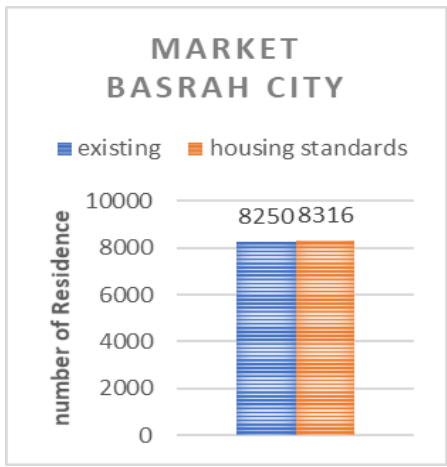

Figure 27. Markets indicators area in Basrah city

7. DWELLING UNIT DESIGN INDICATORS

7.1 Types of residential units

All residential communities have fulfilled the requirements of residential standards with regard to diversity in the types of dwelling units, as shown in the Table 3.

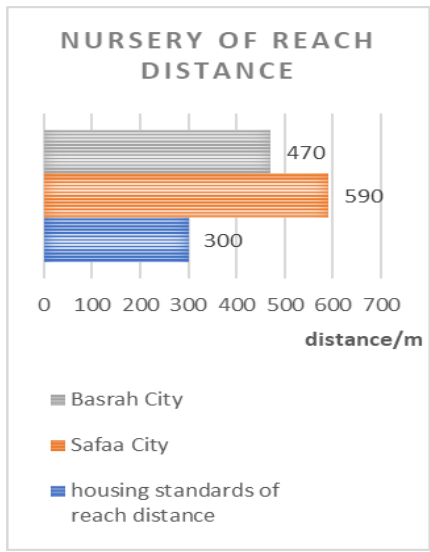

Figure 28. Distance of nursery indicators

7.2 The distance of access to social services

The Andalus city complex did not achieve the standards of access to social services, while the city of Al-Safaa complex met the standards except for the two services (the nursery and the kindergarten), and the city of Basra complex achieved the standards except for the nursery services, according to the measurements extracted from the sites shown in the Table 4 and Figures 28-34.

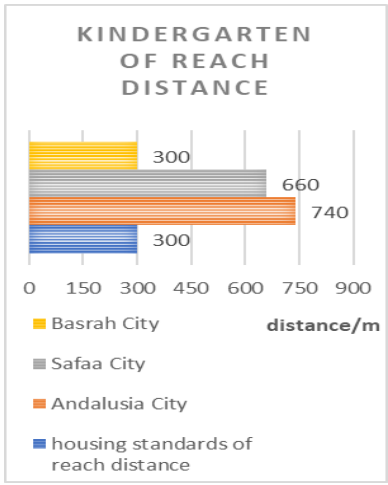

Figure 29. Distance of kindergarten indicators

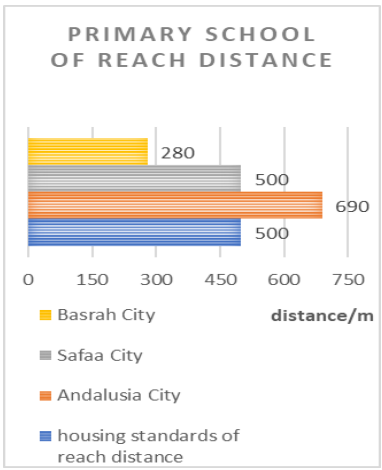

Figure 30. Distance of primary school indicators

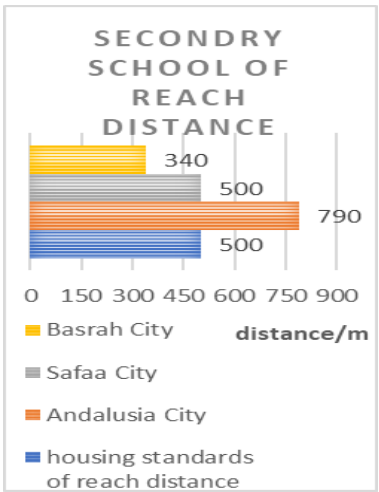

Figure 31. Distance of secondary school indicators

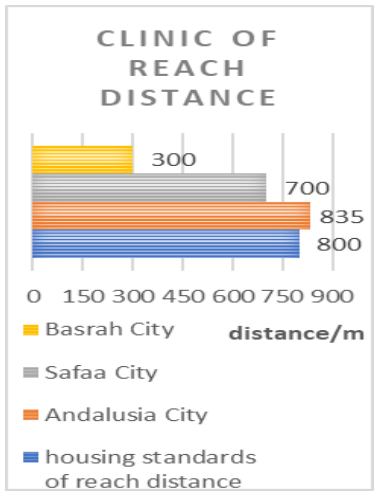

Figure 32. Distance of clinic indicators

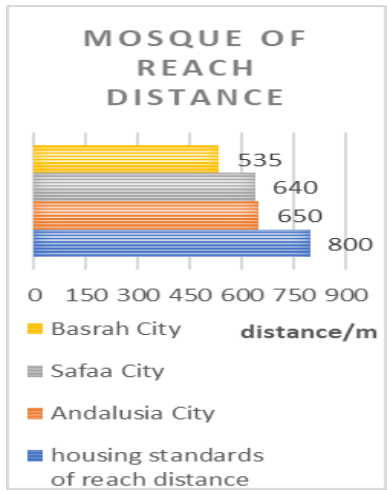

Figure 33. Distance of mosque indicators

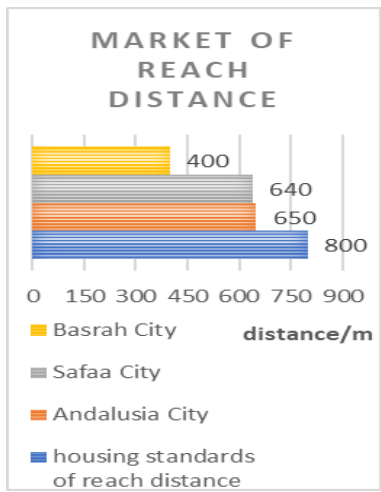

Figure 34. Distance of market indicators

7.3 Open spaces

The three residential complexes met the requirements of residential standards for outdoor spaces according to their types, except for the Safaa city complex, which lacked spaces for children's play for age groups under 11 years, compared to the standards required according to the population of each community, as shown in the Table 5 and Figures 35-40.

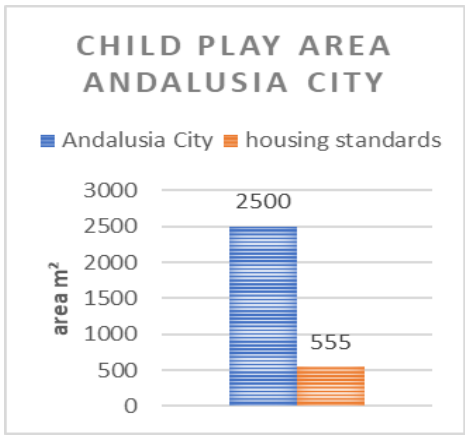

Figure 35. Open space child play Indicators in Andalus city

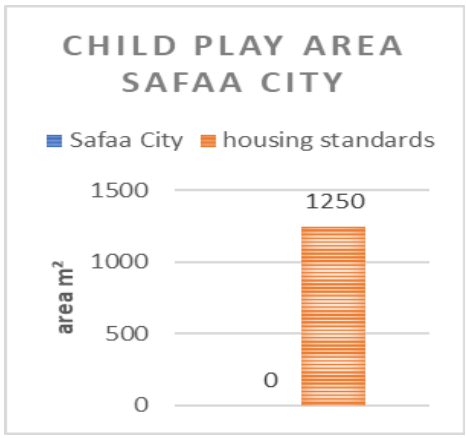

Figure 36. Open space child play Indicators in Safaa city

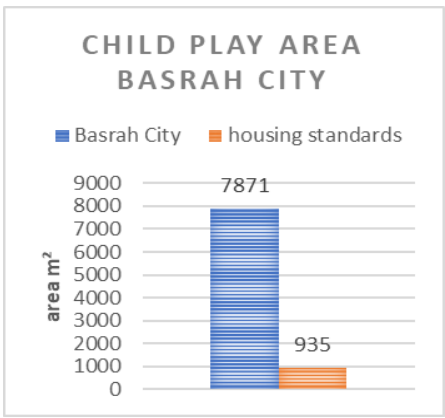

Figure 37. Open space child play Indicators in Basrah city

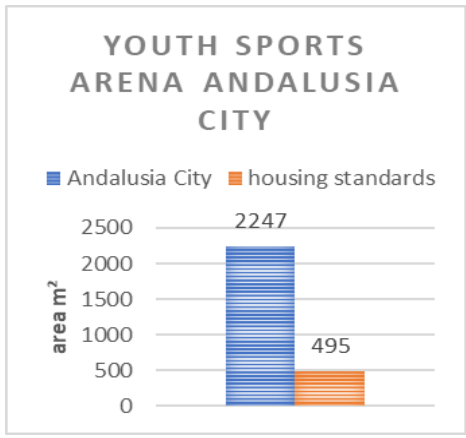

Figure 38. Open Space youth sport Indicators in Andalus city

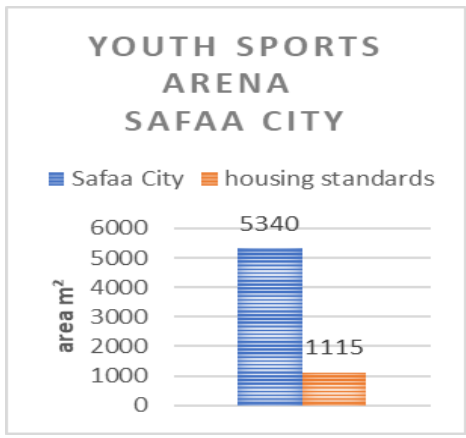

Figure 39. Open space youth sport Indicators in Safaa city

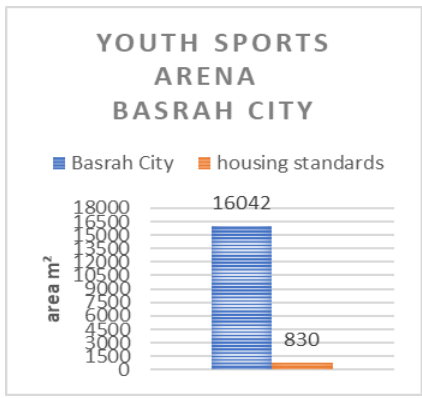

Figure 40. Open space youth sport Indicators in Basrah city

8. TABLES

Table 1. Indicators of residential locale planning (By author)

Basra City		Safaa City		Andalus City		Residential Standards		Indicators
47.5 hectares		50 hectares		25 hectares		30 hectares		**Site area**
1386		1822		824		400- 600		**The number of residential units**
780 ver.	606 hor.	1468 ver.	354 hor.	348 ver.	476 hor.			
8316		11142		4944		2400-3600		**Size / people**
52 ver.	25 hor.	82 ver.	17.7 hor.	115 ver.	19 hor.	35-60 ver.	19-32 hor.	**Residential density** (dwelling unit/ha)
312 ver.	151 hor.	480 ver.	125 hor.	696 ver.	114 hor.	150-250 ver.	50-200 hor.	**Population density** (person/ha)

out of close to within

Table 2. Planning indicators for social services /area (By author)

Basra City		Safaa City		Andalus City		Residential Standards for the Land Area	Type of Public Service Buildings/ m²
1600	existing	450	existing	0		0.25-1 / population	**5nursery/ m²**
2000	Standard	2785	Standard				
4000	existing	2000	existing	420	existing	0.5-2 / population	**Kindergarten / m²**
4158	Standard	5500	Standard	2470	Standard		
15000	existing	14000	existing	4200	existing	3.0-3.5/ population	**Primary school/m²**
25000	Standard	33000	Standard	14800	Standard		
9000	existing	14000	existing	4200	existing	1.6-2/population	**Secondary school/m²**
13300	Standard	17800	Standard	8000	Standard		
1700	existing	900	existing	3100	existing	0.35/population	**Health center/m²**
2900	Standard	3900	Standard	1730	Standard		
425	existing	3200	existing	960	existing	0.125/population	**Mosque/m²**
1000	Standard	1400	Standard	618	Standard		
8250	existing	7200	existing	2000	existing	1/population	**Shopping center/m²**
8316	Standard	11142	Standard	4944	Standard		

out of close to within

Table 3. Residential unit design indicators (By author)

Basra City	Safaa City	Andalus City	Residential Standards	Dwelling Class
				Single Family Dwellings:
	500	480	400-600	**Separate**
400	320	-	300-400	**Semi detached**
200	250	200	200-350	**Detached**
-	-	-	150-300	**Courtyard dwellings**

out of close to within

Table 4. Distance of access to social services indicators (By author)

Basra City	Safaa City	Andalus City	Residential Standards to Reach Distance / m	Type of Public Service Buildings
470	590	-	300	**Nursery**
300	660	740	300	**Kindergarten**
280	500	690	500	**Primary school**
340	500	790	500	**Secondary school**
300	700	835	800	**Clinic**
535	640	650	800	**Mosque**
400	425	840	800	**Markets**

out of close to within

Table 5. Open space indicators (By author)

Basra City	Safaa City	Andalus City	Total Area of Residential Standards	Open Area Class
1247 children	1671 children	740 children		
1663 youth	2228 youth	989 youth		
7871 m²	0	2500 m²	0.75 m²/ person	**Playground for children aged (6-11) years**
935 m²	1250 m²	555 m²	Standard	**15% of the population is children.**
16042	5340M²	2247	0.50 m²/ person	**Sports area for youth (12-18) years**
830 m²	1115 m²	495 m²	Standard	**20% of the population is young people.**

out of close to within

9. CONCLUSIONS

After deciding the goal of the study, which was to compare the design and planning of three housing complexes in the city of Basra to the standards for urban housing in Iraq via three main types of indicators using data, charts, and information obtained from site visits to determine the extent to which the actual condition of the chosen residential communities and the size of the gap between them are related in order to achieve the level of satisfaction, the research set out to do three main things. The research's analytical investigation generated the following results:

1. The study found that the population of the three residential compounds and the number of residence

units for the residential complexes were not subject to any specific standards, and that the residential and residential densities I indicated were different from the criteria that were adopted for the analysis.

2. The social services provided to the three residential communities' members fell significantly short of meeting the minimum requirements for the number of places allotted based on population size.
3. The indicator for the design of the Residence units was achieved in all the three residential communities in terms of the types of spaces for the Residence units.
4. There was a discrepancy in the residential communities' achievement of the norms for the distance of access to services, with the residential complex of the city of Andalus failing to do so, whilst those of the cities of Al-Safah and Basra did. Despite the exception of the nursery and kindergarten, it met the requirements for service access distance.
5. In terms of the amount of open space needed for the population's various age groups, the residential communities complied with the specifications.

Due to this, the majority of the accepted standard residential criteria for analysis were not met by the residential communities, indicating that they did not satisfy the needs and preferences of the residents. As for the number and accessibility of services, this is because the research locations that were chosen did not rely on any particular planning or design criterion.

The research proposes, as future studies, to study the impact of urban sustainability standards on residential complexes in the city of Basra, to find out the size of the gap between them, in order to reach a residential environment that achieves the satisfaction of the residents in Basra city.

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REFERENCES

[1] Adekunle, F., Johnson, O., Linda, O, Mayowa. O. (2018) Housing quality and risk factors associated with respiratory health conditions in Nigeria. Housing. http://dx.doi.org/10.5772/intechopen.78543

[2] Umeora, C.O., Ike, G.C. (2021). Assessment of residents' satisfaction with housing unit features in private housing estates in Enugu Metropolis, Nigeria. African Research Journal of the Environment, 4(2): 29-36. https://doi.org/10.36265/arejoen.2021.010110

[3] Lanrewaju, A.F. (2012). Urbanization, housing quality and environmental degeneration in Nigeria. Journal of Geography and Regional Planning, 5(16): 422-429. https://doi.org/10.5897/JGRP12.060

[4] Adeoye, D.O. (2016). Challenges of urban housing quality: Insights and experiences of Akure, Nigeria. Procedia-Social and Behavioral Sciences, 216: 260-268. https://doi.org/10.1016/j.sbspro.2015.12.036

[5] Muhammad, M.S., Bello, H.T., Ishaq, M.M., Bello, M.U., Adamu, D. (2021). Factors determining housing quality in selected neighbourhoods of the Bauchi metropolis, Nigeria. Path of Science, 7(12): 2007-2014. https://doi.org/10.22178/pos.77-8

[6] Foley, D.L. (1980). The sociology of housing. Annual Review of Sociology, 6(1): 457-478. https://doi.org/10.1146/annurev.so.06.080180.002325

[7] Vera-Toscano, E., Ateca-Amestoy, V. (2008). The relevance of social interactions on housing satisfaction. Social Indicators Research, 86(2): 257-274. https://doi.org/10.1007/s11205-007-9107-5

[8] Mohit, M.A., Raja, A.M.M.A.K. (2014). Residential satisfaction-concept, theories and empirical studies. Planning Malaysia, (3): 47-66. https://doi.org/10.21837/pm.v12i3.131

[9] Brkanić, I. (2017). Housing quality assessment criteria. Electronic Journal of the Faculty of Civil Engineering Osijek-e-GFOS, 8(14): 37-47. https://doi.org/10.13167/2017.14.5

[10] Mridha, M. (2015). Living in an apartment. Journal of Environmental Psychology, 43: 42-54. https://doi.org/10.1016/j.jenvp.2015.05.002

[11] Abdullah Al Rakib, M., Rahman, N., Arpi, S., Ferdouse, J., Ratu, F.A., Hossain, N., Zubayer, M.S. (2020). An assessment on the housing satisfaction of padma residential area, Rajshahi. In 1st International Student Research Conference -2020, Dhaka, Bangladesh. https://www.researchgate.net/publication/346657026.

[12] Easthope, H. (2004). A place called home. Housing, Theory and Society, 21(3): 128-138. https://doi.org/10.1080/14036090410021360

[13] Morris, E.W., Winter, M. (1975). A theory of family housing adjustment. Journal of Marriage and the Family, 37(1): 79-88. https://doi.org/10.2307/351032

[14] Poli, T.P.A., Adianto, J. (2022). Housing satisfaction of the Indonesian adolescents. International Journal of Built Environment and Scientific Research, 6(1): 1-16. https://doi.org/10.24853/ijbesr.6.1.1-16

[15] Francescato, G. (1998) Residential Satisfaction, in van Vliet-W.(ed.) Encyclopedia of Housing, Monterey, CA: Sage.

[16] Amerigo, M. (2002). A Psychological Approach to the Study of Residential Satisfaction, Residential Environments, London.

[17] Omer, L., Berkoz, L. (2005). Determinants of user satisfaction in housing and environmental quality: Sample of Istanbul metropolitan area. https://2u.pw/mpgiGfH.

[18] Weidemann, S., Anderson, J.R. (1985). A conceptual framework for residential satisfaction. In Home Environments. Human Behavior and Environment, vol. 8. Springer, Boston, MA. https://doi.org/10.1007/978-1-4899-2266-3_7

[19] Campbell, A., Converse, P.E., Rodgers, W.L. (1976). The Quality of American Life: Perceptions, Evaluations, and Satisfactions. New York: Russell Sage Foundation.

[20] Marans, R.W., Rodgers, W. (1975). Toward an understanding of community satisfaction. Metropolitan America in Contemporary Perspective, Vincent P. Rock (Derleyen), New York: Halstedd Press.

[21] Wiesenfeld, E. (1992). Public housing evaluation in Venezuela: A case study. Journal of Environmental Psychology, 12(3): 213-223. https://doi.org/10.1016/S0272-4944(05)80136-7

[22] Bardo, J.W., Hughey, J.B. (1984). The structure of community satisfaction in a British and an American community. The Journal of Social Psychology, 124(2): 151-157. https://doi.org/10.1080/00224545.1984.9922842
[23] Elsinga, M., Hoekstra, J. (2005). Homeownership and housing satisfaction. Journal of Housing and the Built Environment, 20: 401-424. https://doi.org/10.1007/s10901-005-9023-4
[24] Streimikiene, D. (2015). Quality of life and housing. International Journal of Information and Education Technology, 5(2): 140-145. https://doi.org/10.7763/ijiet.2015.v5.491
[25] Uzoma, I.E. (2002). Assessment of Indicators of Urban Housing Quality in Owerri Municipal, Nigeria: A Factor Analysis Approach. In Promoting Statistical Practice and Collaboration in Developing Countries, pp. 387-405. Chapman and Hall/CRC. https://doi.org/10.1201/9781003261148-34
[26] Cloutier, S., Pfeiffer, D. (2015). Sustainability through happiness: A framework for sustainable development. Sustainable Development, 23(5): 317-327. https://doi.org/10.1002/sd.1593
[27] Mouratidis, K. (2020). Commute satisfaction, neighborhood satisfaction, and housing satisfaction as predictors of subjective well-being and indicators of urban livability. Travel Behaviour and Society, 21: 265-278. https://doi.org/10.1016/j.tbs.2020.07.006
[28] Kovacs-Györi, A., Cabrera-Barona, P., Resch, B., Mehaffy, M., Blaschke, T. (2019). Assessing and representing livability through the analysis of residential preference. Sustainability, 11(18): 4934. https://doi.org/10.3390/su11184934
[29] Schneider, S., Fischer, J.R., König, R. (2011). Rethinking automated layout design: Developing a creative evolutionary design method for the layout problems in architecture and urban design. In Design Computing and Cognition'10. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-0510-4_2
[30] Chen, X., Xiong, Y., Wang, S., Wang, H., Sheng, T., Zhang, Y., Ye, Y. (2022). ReCo: A dataset for residential community layout planning. arXiv preprint arXiv: 2206.04678. https://doi.org/10.48550/arXiv.2206.04678
[31] Chirkin, A.M., König, R. (2016). Concept of interactive machine learning in urban design problems. In Proceedings of the SEACHI 2016 on Smart Cities for Better Living with HCI and UX, pp. 10-13. https://doi.org/10.1145/2898365.2899795
[32] Miao, Y., Koenig, R., Knecht, K. (2020). The development of optimization methods in generative urban design: A review. In the 11th Annual Symposium on Simulation for Architecture and Urban Design, pp. 1-8. https://www.researchgate.net/publication/344460745
[33] Osintseva, I., Koenig, R., Berst, A., Bielik, M., Schneider, S. (2020). Automated parametric building volume generation: A case study for urban blocks. In Proceedings of the 11th Annual Symposium on Simulation for Architecture and Urban Design, pp. 1-8. https://www.researchgate.net/publication/344460547
[34] Ying, X.Y., Qin, X.Y., Chen, J.H., Gao, J. (2021). Generating residential layout based on AI in the view of wind environment. In Journal of Physics: Conference Series, 2069(1): 012061. https://doi.org/10.1088/1742-6596/2069/1/012061
[35] Authority, P.H. (2010). Urban housing standards. The Ministry of Construction and Housing. https://2u.pw/s5cXD1X.