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An Examination of Mass Housing Residents' Satisfaction with Social Sustainability

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ABSTRACT

With an increased demand for housing, mass housing focuses on speed and economic benefit and standardizes. Different user groups cannot find answers to some of their physical and social needs in this housing and its surroundings. This circumstance generates socially unsustainable regions. From this point of view, the study seeks answers to the questions "What is the social sustainability satisfaction level of the users?" and "Is there a statistically significant difference between the social sustainability satisfaction levels and the different characteristics of the users in the existing mass housing areas?" So, the study reveals the criteria necessary for ensuring social sustainability, defines the level of satisfaction with the fulfillment of these criteria, and determines the statistical difference in satisfaction based on resident characteristics. The link between housing and social sustainability was evaluated using the criteria of social equity and sustainability of community. 87 residents filled out the questionnaire form in a mass housing complex in Istanbul. Researchers used descriptive statistics, the Mann Whitney-U, and the Kruskal-Walis tests to define the statistical difference between social sustainability parameters and the demographic characteristics of the residents. The analysis revealed that inclusion and spatial diversity satisfaction on the housing scale were at the highest level and satisfaction with the Participation criteria was at the lowest level in ensuring social sustainability. The results of the Mann-Whitney U and Kruskal-Wallis tests are as follows: The spatial diversity satisfaction differed in terms of education, economic status, housing type, and length of residence; the social diversity satisfaction differed in terms of gender and age; and the accessibility sub-criterion differed in terms of gender. Only social interaction satisfaction differed by gender, education, and employment status among the sustainability of community criteria. The satisfaction of inclusion, security, community stability, sense of place, and participation were unaffected by demographic characteristics.

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1. Introduction

Housing is the most significant and prevalent building type in the built environment. Many natural, environmental, cultural, social, and legal factors influence housing's transformation into an objective product (Gür, 2000). Based on place and user, these factors differentiate the house's meaning and structure. While the factors that comprise housing necessitate a subjective structure, today's housing and its environments create single-type housing areas that indicate the use of a specific group.

Mass housing, which has an essential share in creating a living space, is favored in housing production due to its ability to respond to social, economic, technological, infrastructure, and transportation issues from a single source and its high demand rate (Arslan, 2007). Due to the housing production process's emphasis on speed and economic benefit, design considerations are limited, which makes it challenging to accommodate varied user needs within the same living space. That prevents the development of future-oriented models that can meet the demands of users throughout their life cycles. Socially and physically unsustainable living environments cause the formation of settlements that are in a state of perpetual alteration and adversely influence both their micro and macro environment and urban integrity (Ataöv & Osmay, 2007).

With its design, scale, and population, mass housing has the potential to change the physical and social structure of its surroundings. These settlements, together with their surroundings, should be handled meticulously and in a future-oriented manner. Maintaining the interaction, equality, and continuity of people who live in and around a building contributes to the social sustainability of the area. These favorable conditions can only be attained by comprehending social sustainability and implementing the criteria defining the phenomenon. The main reasons for social sustainability in a region is given below. The issue that researchers emphasize is egalitarianism, integration, interaction, and a sense of belonging to the community.

- Everyone should have equal rights regardless of social, physical, or economic differences (Sach, 1999).
- The cultural integration of society's many groups should be ensured. These groups should adapt to the community's changing and evolving character (Polese & Stren, 2000; Biart, 2002).
- Users should develop a range of community-beneficial activities (McKenzie, 2004; Partridge, 2005).
- Interactive and long-term social capital should be created in housing areas (City of Vancouver, 2005; HACT, 2015).
- The sense of belonging to the community should be reinforced (Chan & Lee, 2008; Colantonio & Dixon, 2009).
- Users should be able to continue their lives comfortably and satisfied (Bramley et.al, 2009).
- Desired results should be aimed not only at a part of society but also at everyone (Vallance et.al, 2011).

As of 2000, social sustainability has gained more importance and has chiefly been examined at the scale of the neighborhood unit (Woodcraft, 2012). The concept is still being examined within the scope of urban regeneration issues, especially at the scale of the neighborhood unit (Arısoy, 2014; LUDA, 2003; Var, 2015; Durand, 2018). However, social sustainability is a phenomenon that aims to be achieved not only in regeneration areas but also in all residential areas. Especially since the 2000s, the increase in housing supply and demand through TOKI (Housing Development Administration of the Republic of Turkiye) (Koca, 2016) and private initiatives in Turkiye have made the social sustainability of these areas an essential problem. By focusing on this problem, the study was carried out in existing mass housing areas, unlike many social sustainability studies. The expectations and demands of the users having different characteristics like age, skill, gender, and economic level, from their residences, the residential settlements, and their immediate surroundings are also various. However, these expectations and demands generally have not been met in the housing, which is thought to have a single type of user and accordingly designed almost as a single type. Therefore users' satisfaction with the settlement they live in becomes a significant issue for the quality of life. In this respect, the study seeks to answer the question of how social sustainability can be achieved in existing mass housing areas based on the descriptive characteristics of residents. So, the study aims to reveal the components of social sustainability for housing areas, determine the level of residents' satisfaction with these components and reveal whether there is a difference in satisfaction based on resident characteristics (gender, age, education, employement, economic, type of housing, duration of residence in the house) according to their satisfaction levels. Once and for all, explaining the relationship between the demographic features of residents and the level of satisfaction with these components is the main issue.

2. Theoretical Background

2.1. Sustainable Urbanization, Social Sustainability, and Physical Environment Correlation

Sustainable development means meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. The notion of sustainable development arose in reaction to the damage to the natural environment caused by technological and industrial advancements in the 19th century (WCED, 1987). On the other hand, sustainable urban developments emerged in the last quarter of the 20th century and were formed based on ecology (WCED, 1987; Lele, 1991; Bozlağan, 2005). The concept of sustainable development is examined in terms of three criteria: environmental, economic, and social (Figure 1) (Harris, 2000; Chan & Lee, 2008; Colantonio, 2009).

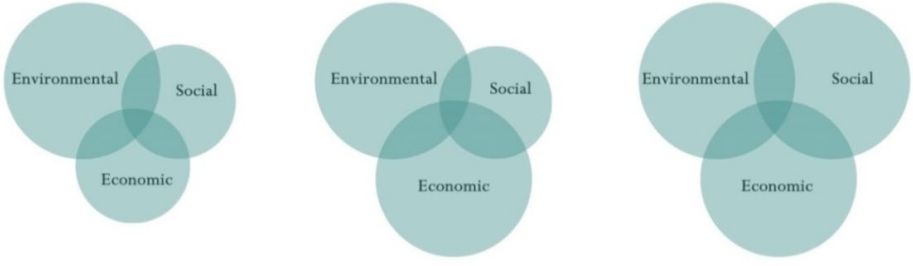

Figure 1 Relative importance levels of sustainable urban development criteria (Doğu & Aras, 2019)

Environmental sustainability is the ability of the ecosystem to maintain and improve its current state and to stabilize the quality of the ecosystem in the short and long term. Economic sustainability is meeting present consumption without compromising its capacity to meet future needs (Khan, 1995). The last component of sustainability, social sustainability, aims to provide a quality of life for communities today and in the future. Although the concept of sustainable urbanization was examined with these three components, the components gained equal importance in the 2000s (Colantonio, 2009; Woodcraft, 2012). Since the 2000s, there has been increased research and application of the notion of social sustainability in regard, and it is strongly tied to changes and destructions in the social structure of cities. More specifically, the struggle of cities with stresses that may lead to social disintegration, such as migration and overpopulation, has required a focus on the social issues of cities (Colantonio, 2009).

2.2. Social Sustainability Concept and Its Criteria

There is no agreed-upon definition of social sustainability; the concept is multidimensional and a dynamic phenomenon that can change over the years (Dempsey et al., 2011). The term is mainly based on equity, democracy, and social justice (Sach, 1999). It is also an expression of the quality of life of people now and in the future (Polese & Stren, 2000; Bacon et al., 2012). Social sustainability attempts to provide equitable, future-oriented, participatory and desired outcomes for all to build strong communities (Vallance et al., 2011). While the objectives and concerns are national and global, the application areas are mainly in a neighborhood unit (Bacon et al., 2012; Woodcraft, 2012).

The social sustainability concept is examined through its constituent themes to understand and apply social sustainability (Partridge, 2005). While social sustainability was defined with more measurable criteria at the time it was conceptualized, today concept has become more abstract and less measurable due to the increase in the number of people working on it and the expansion of application areas (Colantonio, 2009). The fact that the scope of social sustainability is quite broad and that many researchers address it has caused the subject to be evaluated within the framework of different criteria. Figure 2 displays the key concepts through which key researchers have predominantly addressed social sustainability.

The priorities, criteria, and implementation practices of social sustainability vary from region to region. For achieving social sustainability, it is vital to design each living environment according to its potential and expectations. Researchers have created diverse criteria frameworks customized to particular contexts for evaluating the concept of social sustainability in various levels of residential settings. The two concepts most frequently used at the neighborhood unit scale and discussed within this study's scope are social equity (Burton, 2000; Chan and Lee, 2007; Colantino & Dixon, 2009; Dempsey et.al, 2011; Yung & Chan, 2012; Bramley et al., 2009) and sustainability of community (Chiu 2003; Bramley et.al., 2009; Dave, 2011; Dempsey vd., 2011). social equity attempts to ensure that all members of a community can utilize their physical environment and community-provided opportunities equally (Bramley et al., 2009). Sustainability of community aims to transfer the community's healthy operating order into the future (Dempsey et al., 2011). In the context of the concepts of social equity and Sustainability of Communities, numerous sub-criteria are examined across different scales of the built environment. Upon examination of the common points among all the sub-criteria and the criteria about the scope of housing and its immediate surroundings, a comprehensive framework was developed. This framework was crafted based on identifying the most relevant sub-criteria that could be utilized effectively within the scope of the study. These sub-criteria are accessibility, inclusion, and diversity for social equity; security, social interaction, sense of place, community stability, and participation for sustainability of community (Figure 3).

Social Equity: The concept of social equity defines an equal right to use and access essential services, facilities, and units considered vital for that place within the scope of the residence and its surroundings (Bramley & Power, 2009). In the context of social equity, the criteria of accessibility, inclusion, and diversity take precedence.

• *Accessibility:* Within the social equity concept, Accessibility is the most broadly discussed sub-criteria in the social sustainability literature. Living in physically and socially accessible environments is a prerequisite for achieving social equity (Chan & Lee, 2008; Bramley et.al, 2009; Bramley & Power, 2009; Dave, 2011). Accessibility is the capacity of people of varying ages, talents, and disabilities to safely access all indoor and outdoor spaces without the need for the help of another person (Demirkan, 2015). To provide social sustainability to the housing and its immediate surroundings, accessibility is expected to be hassle-free (Barton, 2000). The importance of the units to be accessed varies from region to region. However, the literature includes the essential daily services of health (family health center, hospitals, etc.), education (school, kindergarten, course, etc.), transportation (public transport, etc.), dwelling (access to the dwelling site), commerce (grocery store, etc.), and social units (recreational areas, places of worship, etc.) (Mckenzie, 2004; Dempsey et al., 2011).

• *Inclusion:* Inclusion signifies that a variety of products, services, or units can be utilized by most of the community without adaptation or particular use (BSI, 2005, as cited in Ergenoglu, 2013). Through inclusion, social sustainability seeks to prevent social exclusion (Partridge, 2005). Inclusive environments has been highlighted as essential elements of social sustainability (Dempsey et.al., 2011). Equal opportunities and resources are necessary regardless of physical or social traits. Inclusive environments create a fairer society where everyone can reach their full potential and contribute to their community. At the scale of housing and its immediate surroundings, the availability of the facilities, units, and services that residents frequently use directly impacts the community's sense of equity and satisfaction.

• *Diversity:* To ensure social equity, diversity seeks to preserve the differences that constitute the community and carry them into the future (Table 1). Woodcraft et.al. (2011) considers diversity as the harmonious coexistence of individuals from different beliefs, cultures, and backgrounds. Environments lacking diversity will inevitably lead to social exclusion. This causes to inequity at various community groups (Taket et.al., 2014). To protect social diversity, it is crucial to make proper arrangements in the built environment that provide for the distinctive needs of diverse user groups (Colantonio & Dixon, 2009). To ensure the criterion,

social, cultural, and economic diversity should be supported, and the right solutions should be produced in the physical environment. In particular, the diversity of housing plans, the diversified physical environment, and the protection of the socio-economic differences of the communities are the indicators of this criterion.

Author	Feature	Author	Feature
Chambers and Conway (1992)	Livelihood Equity Capability to withstand external pressures Safety nets	**DFID (1999)**	Inclusion Equity Poverty Livelihood
Sach (1999)	Equity Democracy Human rights Social homogeneity Equitable income distribution Employment Equitable access to resources and social services	**Hans-Böckler-Stiftung (2001)**	Paid and voluntary work Basic needs Social security Equal opportunities to participate in a democratic society Enabling of social innovation
Thin et al. (2002) DIFD	Social justice Solidarity Participation Security	**Omann and Spangenberg (2002)**	Education Skills Experience Consumption Income Employment Participation
Baines and Morgan (2004), (Sinner et al., 2004)	Basic needs Personal disability Needs of future generations Social capital Equity Cultural and community diversity Empowerment and participation	**Bramley et al. (2006)**	Interactions in the community/social networks Community participation Pride and sense of place Community stability Security (crime)
Colantonio and Dixon (2009)	Demographic changes Education and skills Employment Health and safety Environmental and housing health Social capital Social mixing and cohesion; Identity, sense of place and culture	**Dave (2011)**	Access to facilities and amenities Amount of living space Health of the inhabitants Community spirit and social interaction Safety Satisfaction with the neighborhood
Dempsey et al. (2011)	Social interactions Participation Community stability Pride and sense of place Social equity Safety and security	**Larimian and Sadeghi (2021)**	Neighbourhood satisfaction Sense of place Safety and security Social equity Social interaction Housing satisfaction Social participation

Figure 2 Key themes for social sustainability (Expanded by the authors regarding Colantonio, 2009)

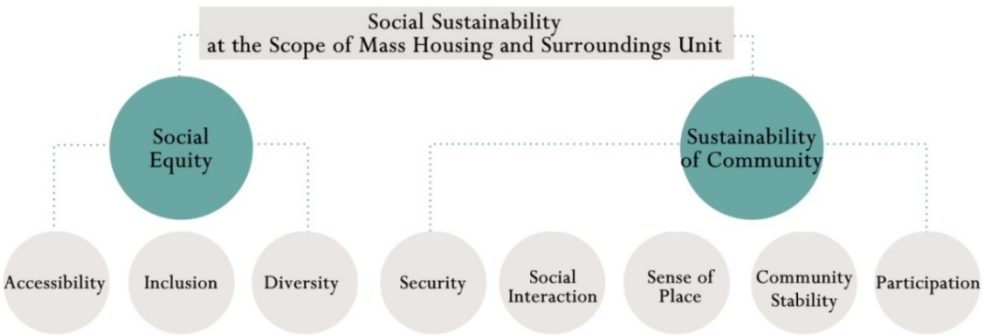

Figure 3 The Sub-criteria and Criteria of Social Sustainability.

Sustainability of Community: The concept is related to the quality of life in any region and the community's participatory interactions (Dempsey, 2011). In the literature, sustainability of community is examined primarily within the scope of security, social interaction, sense of place, community stability, and participation criteria. (Bramley & Power, 2009; Dave, 2011, Dempsey et.al., 2011). In the study, these concepts are focused on the scale of housing and its immediate surroundings.Table 1).

Table 1 The Sub-criteria of Social Equity and Sustainability of Community

Social Equity		
Sub-Criteria	Definitions	The Researchers
Accessibility	In terms of social and physical aspects, seamless access to services and units	Sachs, 1999; Mckenzie, 2004; Partridge, 2005; Chan & Lee, 2008; Colantonio & Dixon, 2009
Inclusion	Utilization of built environments by individuals of varying ages, abilities, and disabilities	Morgan & Baines, 2004; Partridge, 2005
Diversity	Conservation and maintenance of cultural, social and spatial diversity; ensuring social diversity and cohesion	Sachs, 1999; CSA, 2003; Mckenzie, 2004; Morgan & Baines, 2004; Colantonio & Dixon, 2009; Okumuş, 2017
Sustainability of Community		
Sub-Criteria	Definitions	The Researchers
Security	Ensuring health and life safety	Colantonio et.al, 2009; Bramley et.al, 2009
Social Interaction	Development that supports social cohesion	Polese & Stren, 2000; Bramley Colantonio et.al, 2009; Bramley et.al. 2009; Dempsey et.al., 2011
Sense of Place	Preservation of site-specific features, maintaining and promoting a sense of satisfaction and sense of belonging	Chan & Lee, 2008; Bramley et.al, 2009; Colantonio ve Dixon, 2009; Woodcraft et.al, 2011; Yung & Chan, 2012
Community Stability	Balancing migration and mobility concerns inside and outside the city	Mckenzie, 2004; Bramley et.al, 2009; Colantonio & Dixon, 2009
Participation	Collective actions to improve their living environments; participation in decisions and planning for community or geographical structures.	Mckenzie, 2004; Morgan & Baines, 2004; Partridge, 2005; Bramley et.al., 2009; Colantonio et.al, 2009; Yung & Chan, 2012

• Security: The criterion is the most basic human requirement. It has a direct impact on people's well-being and feelings of comfort. The sub-criterion of Security is typically addressed in social sustainability research within the context of residents' ability to feel safe against disorganization, chaos, a high police intervention rate, and criminal elements in their living space (Colantonio & Dixon, 2009; Darchen & Ladouceur, 2013).

• Social Interaction: People's behavioral and affective interactions with one another are referred to as social interaction. It is the most fundamental and natural process in the formation of a community's social order (Wirth, 1967; as cited in Bramley et al., 2009). Knowing their neighbors, meeting them frequently, organizing activities together, and being satisfied with them are all important indicators of social interaction. Fair, strong, and progressive community order can only be achieved with a group that can build social capital through interaction (Bramley et al., 2009). Coleman (1988) argues for establishing an interconnected and productive social interaction to enable social capital formation.

• Sense of Place: The notion means the appreciation of the characteristics of the living space by the inhabitants (Tuan, 1980). The criterion encourages an individual to be satisfied with his or her surroundings by making him or her feel positive about the environment (Bramley et al., 2009). Satisfaction and a sense of belonging are essential indicators of the criterion. The preservation of heritage sites (Chan & Lee, 2008), establishing positive interactions with the environment and people (Heller & Adams, 2009), and ensuring spatial quality (Karuppannan & Sivam, 2011) enhance the sense of place in residential environments and contribute to social sustainability.

• Community Stability is the long-term preservation of human capital and order in a living space. Long-term communities, areas with low residential mobility, areas where social capital can be established, and especially residents who have spent part of their lives in the same residential neighborhood and want to continue living in the same area are important measures of the criterion (Bramley & Power, 2009.). community stability aims to preserve the community's social, cultural, and economic diversity (Potter, 1995). The high housing mobility is attributed to low social cohesion and a sense of belonging among residents, indicating the neighborhood unit's failure to achieve social sustainability (Baines & Morgan, 2003).

Participation: The criterion is frequently examined in the context of social sustainability as participation in design (Chan & Lee, 2008), participation in governance (Sach, 1999; Hans-Böckler-Stiftung, 2001), and participation in community groups (Bramley et al., 2006; Bramley & Power, 2009; Dempsey et al., 2011). Participatory processes strengthen people's relationships with each other, increase residents' commitment to their communities, and build social capital (Woolever, 1992; Bramley et al., 2006; Heller & Adams, 2009). Individuals who can actively participate in the community are concerned about the development of the environment and tend to work for the good of the place (Chan & Lee, 2008).

3. Methodology

The study, investing whether the level of satisfaction with determined social sustainability criteria in mass housing areas varies according to various demographic characteristics of the residents, was designed in a quantitative research model. The survey method was used for the study. The data collected by the questionnaire, developed by the researchers, and data of face-to-face interviews were analyzed using the SPSS for Windows (Statistical Package for Social Sciences) program. In the data analysis descriptive statistics, the Mann-Whitney U, and the Kruskal-Wallis tests were used for analysis.

3.1. Study Area and Study Group

The research area is located in Umraniye district of Istanbul. The social and economic diversity of the residents, the diversity of

housing and social facilities, the fact that the complex has been in use for a long time (16 years), the size and quality of the complex, and the similarity of its relationship with its immediate surroundings and with many mass complexes built in Istanbul all influenced the choice of the study area. Near the complex where the study was conducted, there are various mass housing and single housing blocks and many social (children's playground, green area, sports equipment at a distance of 300-500 m), commercial (market, grocery store, bazaar, tailor, hairdresser, florist, butcher, butcher, haberdashery, dry cleaning at a distance of 50-200 m), educational (primary and secondary schools at a distance of 500 m, high schools at a distance of 1.3 km, kindergartens and nursery schools at a distance of 450-950 m), and medical (health center at a distance of 400 m and 1.2 km, pharmacies at a distance of 300 m, private and public hospitals at a distance of 2-3 km) buildings. Public transportation stops are within accessible distances (the nearest is 400 m away), but the number of timetables is low, and the time interval is long. The TEM highway provides the connection between the complex and the city (Figure 4).

The complex is built on an area of approximately 50,000 m². With a total construction area of 125,000 m², there are a total of 31 blocks and 376 housing units, including 11 Type A, 6 Type B apartment blocks, and 14 Type C detached housing blocks. There are six different design types in total: 1+1 (34 units), 2+1 (34 units), 3+1 (226 units), 4+2 (34 units), 5+2 (34 units), and detached (14 units). The complex has an administrative building, cafeteria, outdoor swimming pool, kindergarten, gymnasium, outdoor playgrounds, outdoor sports fields, security unit, indoor and outdoor parking lots, water features, pond, green areas, and seating units (Figure 5).

Figure 4 Location of the study area relative to Istanbul and Umraniye district

Figure 5 Site overview and site plan analysis

The sample of the study consists of residents living in the mentioned complex. The study group consisted of 87 resident from the complex of 376 houses (calculated 95 % confidence level and 10% margin of error). Participants were chosen by a simple random selection procedure. In the study, only one participant from each house was interviewed, who volunteered to participate in the study and agreed to be interviewed face-to-face.

3.2. Data Collection Tools and Scoring

A structured interview form prepared by the researchers was used as the data collection tool in the study. While preparing the form, an extensive literature review had been carried out and particularly the studies of various researchers on social sustainability and neighborhood unit scale were analyzed and those related to the issue were used (Bacon et al., 2012; Barton

et al., 2012; Egan, 2004; Chan & Lee, 2008). After preparing the survey form expert opinions were taken for developing the questionnaire form. Then the form applied to 10 person for eliminating incomprehensible statements. After the pilot study, the survey form took its final shape. Survey form consists of 10 sections in total, is a 5-point Likert-type form that includes demographic information in the first section and a total of 65 statements in the other ten sections to measure the satisfaction levels from the social sustainability criteria defined according to literature review. Those are accessibility (in-site/near residential neighborhood), spatial diversity (housing/in-site/near residential neighborhood), social diversity, inclusion (housing/in-site), social interaction, community stability, sense of place, security and participation (Appendix 1). Responses to the questionnaire are ranked from most negative (1= strongly disagree) to most positive (5= strongly agree as 1,2,3,4,5. The semantic equivalents of the score values are interpreted as follows: "1.00-1.80: Very Low", "1.81-2.60: Low", "2.61-3.40: Moderate", "3.41-4.20: High", and "4.21-5.00: Very High" (Tekin, 1993).

3.3. Statistical Methods

To state the satisfaction levels and to specify the statistically significant difference in satisfaction based on residents' characteristics (gender, age, education, employment, economic, type of housing, duration of residence in the house), sub-criteria mean scores were used. In determining the statistical methods to be used in the study, firstly, it was taken into account whether the subscale mean scores showed a normal distribution. The Shapiro-Wilk normality test was applied to the data, and it was concluded that the data did not show a normal distribution. Therefore, non-parametric tests were used in the examinations. In this regard, the number of groups was taken as the basis for comparing the sub-criteria mean scores of different groups. Accordingly, the Mann-Whitney U test was used to compare the means of two independent groups, while the Kruskal-Wallis test was used to compare the means of three or more groups. The Mann-Whitney U test was performed in pairs between the groups to ascertain from which groups the difference if any, results from the Kruskal-Wallis test. Bonferroni Correction was used to determine the significance level of the Mann-Whitney U comparison tests conducted in pairs. Accordingly, the significance level was calculated by dividing the significance level α=0.05 by the number of pairwise comparisons.

4. Results and Discussions

Cronbach's Alpha coefficients, mean, and standard deviation values were calculated for all criteria to assess data reliability. According to Table 2, the internal consistency reliability of the sub-criteria of community stability and spatial diversity within the site is acceptable, while the reliability coefficient of all other sub-criteria is good (Kılıç, 2016). These findings demonstrate that the data are reliable.

Table 2 shows the levels of satisfaction with the sub-criteria of the social equity criterion. As a result, residents are very satisfied with the diversity of units at the housing scale (Mean:4,61), highly satisfied with units within the complex (Mean:3,51), and moderately satisfied with units in the neighborhood in terms of spatial diversity(Mean:3,06).

Table 2 Cronbach α Coefficients of Sub-criteria

Criteria	Sub-criteria	Number of Variables	Mean	S.D.	Cronbach α Coefficient
Social Equity	Spatial Diversity (House scale)	5	4,61	3,28	0,887
	Spatial Diversity (Complex scale)	3	3,51	2,23	0,656
	Spatial Diversity (Neighborhood scale)	5	3,06	4,49	0,764
	Social Diversity	6	2,76	3,97	0,722
	Accessibility (Complex scale)	6	4,18	4,77	0,832
	Accessibility (Neighborhood scale)	5	3,43	4,96	0,833
	Inclusion (House scale)	6	4,64	2,87	0,747
	Inclusion (Complex scale)	6	3,87	4,35	0,716
Sustainability of Community	Social Interaction	5	3,22	4,10	0,759
	Security	6	4,16	4,11	0,738
	Community Stability	3	2,76	3,52	0,631
	Sense of Place	5	3,50	4,22	0,800
	Participation	4	2,27	4,67	0,761

According to the interviews, the participants were particularly dissatisfied with the neighborhood's diversity of social, commercial, medical, educational, cultural, and public transportation units. In terms of social diversity, the average respondent is pleased with the neighborhood's social diversity (Mean:2,76). This situation demonstrates that most participants want to avoid living in the complex with people from different economic and social backgrounds and do not want to see persons from outside in the complex. The overall level of satisfaction with accessibility is high. The complex has a higher level of satisfaction with accessibility (Mean:4,18) than the immediate surroundings (Mean:3,43). While residents value access to recreational areas within the complex, access to key services (social, commercial, medical, education, cultural, and public transportation) in the immediate vicinity is viewed as problematic.

Regarding inclusion, there is a high level of satisfaction with the utilization of the spaces inside the residence and the units inside the complex (means of 4.64 and 3.87, respectively). This demonstrates that the housing unit's rooms and wet areas can be used in conjunction with its equipment. The usefulness of the complex's parks and leisure units, stairs, and paths is reduced, although they are still fully usable.

When the satisfaction levels of the sustainability of community criterion's sub-criteria (Table 2) are examined, the overall satisfaction level in terms of social interaction is moderate (Mean:3.22). Although the participants get along well with their small number of neighbors and enjoy meeting and interacting with them, the fact that the complex and neighborhood residents do not know each other in general, as well as the inadequacy of the number and quality of interaction venues, reveal this situation. Security has a high overall level of satisfaction

(Mean:4,16). Within the complex, residents generally feel safe both during the day and at night. The level of satisfaction with the community stability sub-criterion is moderate (Mean:2,76). Therefore, it is assumed that residents' views on moving out of their house and neighborhood when experiencing life events like marriage, having children, or becoming older are on the average level. The average level of satisfaction with the sense of place sub-criterion is high (Mean:3.50). This is related to the fact that users can use their homes effectively and have an active say in their homes. Residents' overall satisfaction with participation is low (Mean:2,27) both within the complex and at the neighborhood scale. This shows that residents are unable to effectively participate in activities, projects, and designs that take place at the scale of the neighborhood unit at the idea or implementation stage.

4.1. Analysis Results for Demographic Characteristics of Residents and Sub-Criteria

Table 3 displays the participants' gender, age, education, employment, economic and ownership status, housing type, and residence duration in the house. Among the participants, 62.1% are female, 37.9% are male, 47.1% are between the ages of 41 and 64 of the participants, 70.1% are homeowners, 29.9% are renters, 50.6% live in 3+1 housing type, 50.5% have lived in their current homes for less than six years. Most participants were university graduates (58.6%), working (50.6%), and considered themselves to be moderate (55.2%).

Table 3. Frequency and Percentages of Demographic Variables

	N	%		N	%
Gender			**Housing Type**		
Female	54	62,1	1+1	7	8,0
Male	33	37,9	2+1	9	10,3
Age			3+1	44	50,6
≤ 20	6	6,9	4+2	11	12,6
21-40	33	37,9	5+2	13	14,9
41-64	41	47,1	Villa	3	3,4
65 ≤	7	8			
Education			**Employment**		
Postgraduate	10	11,5	Student	6	6,9
Undergraduate	51	58,6	Retired	14	16,1
High-school	17	19,5	Non-working	23	26,4
Primary-school	9	10,3	Working	44	50,6
Economic			**Ownership**		
High	15	17,2	Homeowner	61	70,1
High-Moderate	15	17,2	Renter	26	29,9
Moderate	48	55,2	**Residence Duration in the House**		
Low- Moderate	9	10,3	≤ 6 years	44	50,5
			7 years ≤	43	49,5

The social sustainability sub-criteria were analyzed separately based on the demographic characteristics of the participants; in this section of the study, only the analysis results that showed a significant difference are included (Figure 6).

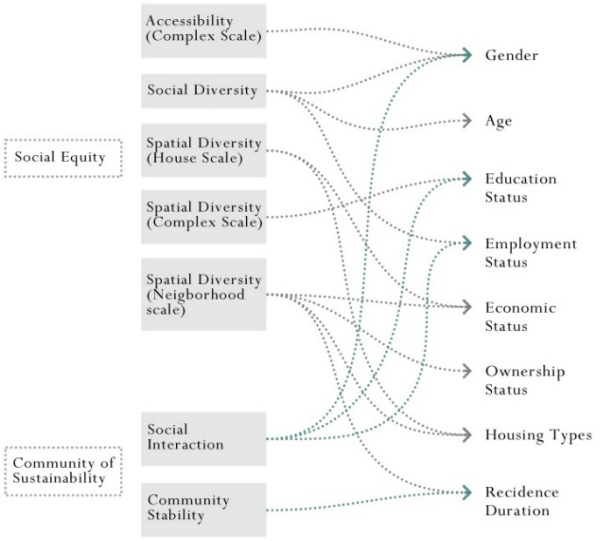

Figure 6. The significant differences between the sub-criteria and the demographic characteristics

Mann-Whitney U test was used to analyze whether participants' levels of social sustainability sub-criteria display significant differences in terms of gender (Table 4). Participants' level of satisfaction with accessibility differs significantly based on gender ($p<0.05$). Men have higher levels of satisfaction than women. Women's dissatisfaction can be attributed to their concerns about their children and their security. The level of satisfaction with social diversity also differed significantly by gender ($p<0.05$), and the median value showed that men had a higher level of satisfaction (Table 4). This shows that men have a more positive view of social diversity than women. The level of satisfaction with social interaction differs significantly based on gender ($p<0.05$). According to the median values, it is seen that women are more satisfied with social interaction than men. In light of this, women have stronger neighborhood relations in the complex and neighborhood than men.

Table 4 Mann-Whitney U test results in terms of gender

Sub-criteria	Gender	N	Median	U Stats	Z	p
Accessibilty, CS	Male	33	4,67	661,000	-2.032	,042
	Female	54	4,18			
Social Diversity	Male	33	3,00	665,500	-1,993	,046
	Female	54	2,80			
Social Interaction	Male	33	3,17	559,500	-2,906	,004
	Female	54	3,67			

CS: Complex scale

Kruskal-Wallis test was used to analyze whether participants' levels of social sustainability parameters display significant differences in terms of age (Table 5). When the satisfaction levels of the sub-criteria are compared in terms of age, social diversity ($p<0.05$) differs significantly (Table 5). As a result of the Bonferroni correction, the significance level for social diversity was set at 016/6=,0027. As a result of the findings and median values of the groups, it is clear that people aged 20 and younger are more satisfied with living in social diversity in and around their residence than people aged 21–64 years (Table 5). As participants' ages increase, their attitudes toward social diversity become more protective. It is found that individuals below the

age of 20 are more open to interacting with people from diverse ethnic groups, varying economic statuses, and different household backgrounds.

Table 5 Kruskal-Wallis test results in terms of age

Sub-criteria	Age	N	Median	sd	X^2	p	Mann-Whitney U Test		
							X^2	p	Groups
Social Diversity	**1.** 0-20	6	4,10	3	10,313	,016	25,500	,002	1-2
	2. 21-40	33	3,00				25,500	,001	1-3
	3. 41-64	41	3,00						
	4. 65-	7	3,00						

Mann-Whitney U test was used to analyze whether participants' levels of social sustainability sub-criteria display significant differences in terms of education status (Table 6). When the social sustainability criteria were compared to the individual's educational level, no significant differences were discovered. As a result, the test was updated by combining the 'primary school' and 'high school' graduates into group 1 and the 'undergraduate' and 'postgraduates' into group 2.

Participants' satisfaction with the complex's spatial diversity varies significantly according to their educational level ($p<0.05$). Undergraduate and postgraduate graduates are less satisfied with spatial diversity at the complex scale than primary and high school graduates (Table 6). This is because people with higher education levels have higher spatial demands than others. Primary and high school graduates were significantly more satisfied than the other group on the social interaction (Table 6). The finding can be attributed to the high amount of time spent by primary and high school graduates in their residential and immediate surroundings.

Table 6. Mann-Whitney U test results in terms of education status

Sub-criteria	Education	N	Median	U Stats	Z	p
Spatial Diversity, CS	1. Primary and High school	26	4,00	552,000	-2,285	,022
	2. Undergraduate, Postgraduate	61	3,33			
Social Interaction	1. Primary and High school	26	4,00	434,500	-3,331	,001
	2. Undergraduate, Postgraduate	61	3,33			

CS: Complex scale

When the sub-criteria were compared to the individual's employment status, the social diversity ($p<0.05$) and social interaction ($p<0.05$) criteria differ significantly (Table 7). The Bonferroni correction yielded a significance level of .009/6=.0015 in terms of social diversity. In this regard, when the median values are also considered within the context of the social diversity criterion, the students' satisfaction averages are significantly higher than those of the employees. The significance level was set at .001/6=.000 as a result of the Bonferroni correction for the social interaction criterion. As a result, the non-working are significantly more satisfied with social interaction than the working. This can be explained by the fact that the non-working group, entirely composed of women, meets more frequently (Table 7).

Table 7 Kruskal-Wallis test results in terms of employment status

Sub-criteria	Employment	N	M	sd	X^2	p	Mann-Whitney U Test		
							X^2	P	G
Social Diversity	1.Working	44	2,80	3	11,518	,009	23,500	,000	1-4
	2.Non-working	23	3,00						
	3.Retired	14	3,00						
	4.Student	6	4,10						
Social Interaction	1.Working	44	3,17	3	16,850	,001	230,000	,000	1-2
	2.Non-working	23	4,00						
	3.Retired	14	3,50						
	4.Student	6	2,92						

G:Groups, M: Median

The Mann-Whitney U test was used to determine whether participants' levels of social sustainability sub-criteria differed significantly in terms of economic status (Table 8). When the social sustainability criteria were compared to the individuals' economic status, no significant differences were discovered. As a result, the test was updated by combining the 'moderate' and 'moderate-low' groups as well as the 'high' and 'high-moderate' groups.

The level of satisfaction with spatial diversity at the scale of housing and neighborhood varies significantly by economic status ($p<0.05$). Participants with a 'high-moderate' or 'high' economic status are significantly more satisfied with housing diversity than those with a 'low-moderate' or 'moderate' economic status (Table 8). On the neighborhood scale, those with 'high-moderate' and 'high' economic levels have significantly lower average satisfaction values than those with low-moderate, and moderate economic levels (Table 8). Based on the data, the fact that people with higher incomes can organize diversity within housing according to their preferences and live in larger houses explains their higher satisfaction with housing diversity. However, it was discovered that the neighborhood's diversity needed to be improved for them. Moderate-low-income individuals tend to value **spatial diversity** at the neighborhood level more than high-income individuals.

Mann-Whitney U test was used to analyze whether participants' levels of social sustainability sub-criteria display significant differences in terms of economic status and ownership (Table 8).

Table 8 Mann-Whitney U test results in terms of economic and ownership status

Sub-criteria	Economic	N	Median	U Stats	Z	p
Spatial Diversity, HS	**1.**moderate ; moderate-low	57	4,80	644,000	-2,095	,036
	2.high-moderate; high	30	5,00			
Spatial Diversity , NS	**1.**moderate ; moderate-low	57	3,40	582,000	-2,445	,014
	2.high-moderate; high	30	2,80			
	Ownership					
Spatial Diversity (NS)	**1.**Homeowner	61	3.20	543,000	-2,325	,020
	2. Renter	26	3.68			

HS: House scale, NS: Neighborhood scale

The Kruskal-Wallis test was used to analyze whether participants' levels of social sustainability sub-criteria display significant differences in terms of housing type (Table 9). When the social sustainability criteria were compared to the housing type, no significant differences were discovered. For this reason, the test was renewed by combining 1+1 and 2+1 housing types as group 1, 3+1 housing type as group 2, 4+2, and 5+2, and the villa housing type as group 3 according to the size of the housing types. This situation indicates that 1+1 and 2+1 plan types are insufficient in terms of functionality and flexibility for their residents.

Table 9 Kruskal-Wallis test results in terms of the housing type

Sub-criteria	Housing Type	N	M	sd	X^2	p	Mann-Whitney U Test		
							X^2	p	G
Spatial Diversity (House scale)	**1:** 1+1; 2+1	16	4,20	2	16,229	,000	214,500	,015	1-2
	2: 3+1	44	5,00				87,500	,000	1-3*
	3: 4+2, 5+2, villa	27	5,00						
Spatial Diversity (Complex scale)	**1:** 1+1; 2+1	16	3,00	2	8,573	,014	184,500	,004	1-2*
	2: 3+1	44	4,00						
	3: 4+2, 5+2, villa	27	3,33			,004			

G:Groups, M: Median

When the sub-criteria were compared to the participants' housing types, spatial diversity at the residential and complex scales varies significantly (Table 10). The new significance level is .000/6=.000 as a result of the Bonferroni correction in terms of spatial diversity at the residential scale. Those who live in Group 3 housing types are more satisfied with the spatial diversity at the housing scale, according to the median values. The new significance level for spatial diversity at the complex scale is .0014/6=.004 due to Bonferroni correction. It is assumed that residents of 3+1, i.e., Group 2 housing types, are more satisfied with spatial diversity at the complex scale than residents of Group 1 housing types. As a result, it is understood that those living in 1+1 and 2+1 plan types will not be able to achieve spatial satisfaction.

Mann-Whitney U test was used to analyze whether participants' levels of social sustainability sub-criteria display significant differences in terms of the living period of residence (Table 10). Satisfaction with spatial diversity at the complex scale varies significantly with residence length ($p<0.05$). Those who have lived for 6 years or less are more satisfied than those who have lived for 7 years or more. As a result, satisfaction with spatial diversity at the complex scale influences the length of residence. The level of satisfaction with community stability differed significantly by the length of residence ($p<0.05$), and according to the median values, those who have lived for 7 years or more are more satisfied. People who have been residing for 7 years and more are more willing to live in the same residential neighborhood (Table 10).

Table 10 Mann-Whitney U test results in terms of residence duration

Sub-criteria	Residence Duration	N	Median	U Stats	Z	p
Spatial Diversity, CS	**1:** ≤ 6 years	44	3,33	644,000	-2,622	,009
	2: 7 years ≤	43	4,00			
Community Stability	**1:** ≤ 6 years	44	2,50	679,500	-2,269	,023
	2: 7 years ≤	43	2,67			

CS: Complex scale

5. Conclusions and Recommendations

As its conceptual background suggests, social sustainability is an umbrella concept/approach that expresses many dimensions and their interrelationships. As a result, defining, implementing, and monitoring the approach becomes multidimensional, indicating a situation that requires improvement through continuous feedback and monitoring. On the other hand, social change and migration are caused by a variety of factors such as disasters, climate crises, wars, economic crises, and urbanization, the effects of which we are acutely aware and highlight the importance of social sustainability for cities and settlements. So, it is crucial to examine the healthy relationship that mass housing establishes within itself and its environment regarding social sustainability.

Today, it is crucial to examine the healthy relationship that mass housing, which many people demand at both production and usage levels, establishes within itself and with its environment regarding social sustainability. This study aims to define the main criteria of social sustainability at the scale of housing and its environment and to reveal how a more socially sustainable environment can be achieved. For this purpose, how the social sustainability situation differs depending on user characteristics (gender, age, education, employment, economy, ownership, housing type, residence) was investigated through the satisfaction levels of the residents. Satisfaction with social sustainability varies according to demographic data and sub-criteria of people.

According to the study, spatial diversity satisfaction is very high at the residential scale, high on the complex scale, and moderate on the residential neighborhood scale. Satisfaction with spatial diversity at the complex scale varies according to the participants' economic status and housing types. Education, housing type, and length of residence all influence satisfaction with spatial diversity in the complex. In terms of economic and ownership status, satisfaction with spatial diversity in housing and its immediate surroundings varies. It is necessary to target spatial quality in the housing neighborhood to ensure that people from different income and educational backgrounds live in the same housing neighborhood for many years. This necessitates the creation of high-quality social spaces (restaurants, recreation areas, libraries, youth centers, etc.), health units (hospitals or family health centers inaccessible areas), and a public transportation network. The diversity of plans contributes to the spatial diversity of housing.

The satisfaction level of social diversity in the study is moderate, and participants are reluctant to live in the same environment with people from different social, economic, and social levels to develop mutual interactions and participate in activities. It differs by gender and age: men, over 20-aged users, and younger users

are more satisfied. In this sense, for the development of social diversity, safe interaction areas where individuals can get to know each other through different activities should be established.

Satisfaction with accessibility is at a high level and it is varied by gender. Accessibility comes to the forefront for women, whose satisfaction is low, to benefit from the facilities in and around the complex and to participate in the environment, especially with their children. To increase the quality of accessibility, residents should be provided with unobstructed, barrier-free, and landscaped walking paths that facilitate walkability and access to key services and public transportation stops.

The satisfaction level of inclusion is very high in housing units and at the neighborhood scale, and participants found the units within the houses and the complex mostly usable. For inclusion, no differences were found in terms of the changing characteristics of the participants. The inclusion of the needs of individuals with different capabilities (children, elderly, disabled, etc.) in terms of inclusion within the framework of universal design principles is important in terms of planning usable and sustainable areas.

The fact that the level of social interaction satisfaction is moderate indicates that a well-connected social capital could not be established within the scope of the study area. Satisfaction with social interaction differed based on gender, education, and employment status. It is understood that women, the non-working group, and people with primary and high school education levels are more active in establishing social interaction with their neighbors in and around the housing. To increase social interaction, it is necessary to design interaction spaces of different scales that allow individual and collective use and to organize participatory environments and activities that will allow residents to get to know each other.

The level of satisfaction with security is generally high but lower at the neighborhood scale. This result shows that a healthy relationship between the neighborhood and the complex has yet to be achieved. The feeling of insecurity here basically consists of concerns for the security of life and property. It has been observed that way. The level of security satisfaction does not differ in terms of the demographic characteristics of the residents. To increase the level of security satisfaction to a very high level among all people, social interaction should be increased, security of the physical equipment around the housing should be ensured, and visibility and walkability in the neighborhood unit should be increased by local governments, and measures should be taken against crime and disturbances.

Satisfaction with community stability is moderate, and satisfaction does not differ according to the characteristics of the residents. Considering the participants, this situation is an indication that community stability has not been established in the area and that there is a thought of moving in the future. To increase community stability, it is important to increase the diversity of housing plans in the immediate surroundings of the housing, as well as the ease of access to social, cultural, etc. units in the neighborhood and the activation of the public transportation system.

Sense of place satisfaction is at a high level, and no significant difference is observed in terms of the descriptive characteristics of the participants. Residents feel a greater sense of place in their housing and complexes than in their neighborhoods. Developing a sense of place for all in residential areas is based on multifaceted factors. To develop a sense of place, it is necessary to meet basic needs within walkable distances in the physical environment, to increase the number of spaces that will allow social interaction, to protect the area's common cultural values, and to create social capital.

Participation is the criterion with the lowest level of satisfaction, and there is no significant difference based on the participants' descriptive characteristics. One reason is that the housing and its surroundings need to provide participatory organizations for residents of various abilities. To increase participation, complex and neighborhood-level decisions (design, political, social, etc.) and practices should be based on participatory processes accessible to all residents.

The positive contribution of settlements with high economic, environmental, or social sustainability to both the environment and the residents should be addressed. If it is desired to plan/design cities and living spaces where coexistence in prosperity, peace, health, and security will continue for a long time, the driving force of social sustainability criteria must be utilized. Providing a single criterion will not be sufficient to ensure social sustainability, and political and economic support must be provided continuously to create more livable environments. Furthermore, the study indicates that considering the changing demographic characteristics of the participants and incorporating the wishes of the participants with different abilities, ages, genders, etc. into the design and planning processes will contribute to their quality of life and the improvement of the social and spatial quality of their living environments.

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Appendix 1: Variables' Contents of the Sub-criteria

Social Equity's Sub-criteria	**Variables' Contents**
Accessibility	**Complex Scale:** Access to units within the complex scale (Units: House; Buildings; Sports fields; Children's playgrounds; Recreation areas) **Neighborhood Scale:** Pedestrian accessibility to key units neighborhood-scale (Key Units: Social; Educational; Commercial; Health; Public transportation stops)
Inclusion	**House Scale**: Utility of units within the house scale (Units: Kitchen furnishings; Wet areas' furnishings; Living spaces' furnishings; Bedrooms' furnishings; Balconies' furnishings; Residential entrances) **Complex Scale**: Utility of units within the complex scale (Units: Building entrances; Building stairs/elevators; Sports fields; Children's playgrounds; urban equipment in recreation areas; Car park area)
Spatial Diversity	**House Scale:** Sufficiency of the units within the house scale (Units: House type, Size of rooms, Number of rooms, Size of wet areas, Size of kitchen) **Complex Scale:** Sufficiency of the units within the complex scale (Units: Recreation areas; Children's playgrounds; Sports fields). **Neighborhood Scale:** Sufficiency of the units within the neighborhood scale (Units: Social; Educational; Commercial; Health; Public transportations)
Social Diversity	**For All Scales:** The satisfaction of users living in the same environment with individuals from different socio-cultural, ethnic, and household backgrounds has been examined.
Sustainability of Community's Sub-criteria	**Variables' Contents**
Social Interaction	**For All Scales:** The variables include questions about users' familiarity with their neighbors, the levels of satisfaction derived from neighborly relationships, and the nature of their interactions with neighbors.
Security	**For All Scales:** The variables include questions related to users' perceptions of safety during daytime and nighttime, their satisfaction with security services, and their overall satisfaction concerning safety.
Community Stability	**For All Scales:** The variables ask users' perspectives on living in their current residence, another unit within the same housing complex, or a different nearby residence, considering their life cycles.
Sense of Place	**For All Scales:** The variables investigate users' satisfaction and sense of belonging derived from their residences, the mass housing complex, and the neighborhood they live in.
Participation	**For All Scales:** The variables encompass users' participation in the site management and activities within the housing complex and in community events organized within the neighborhood.