

Article

Measuring Social Sustainability with the Developed MCSA Model: Güzelyurt Case

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Abstract: The aim of the study is to develop a sample scale to measure social sustainability in an urban context. Social sustainability is an important component of sustainable development and it gained importance in the 1990s with awareness of the rising welfare of the society. The definitions, criteria, and the measurement system of social sustainability are still vague. In this context, this article bridges the gap in measuring social sustainability in an urban context and it proposes a model called Measurement of the City from Social Aspects (MCSA). The developed model was applied to the city of Güzelyurt, which has continuously experienced immigration from past to present. Quantitative research method was used in the research and the data was collected through interviews and a questionnaire survey, conducted with 400 local residents. The proposed model was tested in terms of model fit using confirmatory factor analysis. Also, the construct validity and discriminant validity of the model were tested. Research results indicate that the developed MCSA model works and it is suitable to be applied to other cities for measuring their social sustainability. Thus, the problems in the social aspects of the cities could be revealed and solutions could be generated to ensure the social sustainability of the cities.

Keywords: social sustainability; sense of belonging; social capital; voice and influence; perceived environment; social interactions; quality of space; Güzelyurt

1. Introduction

The concept of sustainability became well-known after the Brundtland Report was released in 1987 [1]. “Sustainability” and “Sustainable development” are being discussed in a wide range of areas, from social sciences to science and natural sciences, from politics to economy, and from urban planning to architecture. Sustainability originates from environmental, economic, and social dimensions [2–6]. There is a consensus that equal priority is not being given to the different dimensions of sustainable development related to sustainable discourse [7–11] by policy makers [2]. When sustainability concept is taken into account, less attention was put on social sustainability [2,7–11]. Colantonio [2] indicates that the sustainable development debate was first dominated by environmental and economic issues, and social issues were included in the sustainability agenda in the late 1990s (Figure 1). The social aspect of sustainability is the least researched among the three mentioned pillars and it gained importance after 2000 [7].

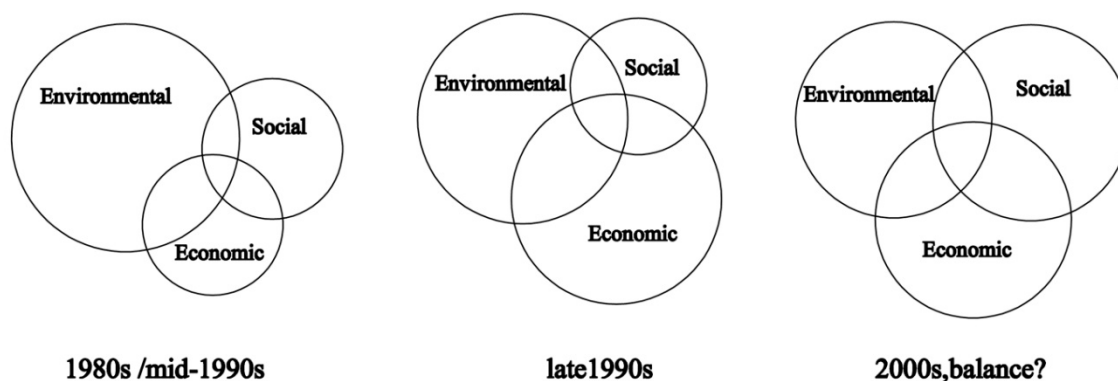


Figure 1. The relative importance of the various dimensions of sustainable development [2].

Chiu [12] describes social sustainability as the conservation and development of the welfare of the present and forthcoming generations. Munro [13] believes that development should contain all the activities that support the well-being of the people, together with the environment. Dempsey et al. [9] state that the definition of social sustainability gains its roots from social community, and the interaction of this community with the environment they live in. Osso, Walsh and Gottfried [14] indicate that sustainability ensures the protection of the artificial and natural environment together by aiming to supply the sustainability of the people and sources. Chiu [12] also agrees with these statements by stating that “social sustainability needs to be environment-oriented and people-oriented”. Sustainable development became associated with the term “sustainable cities” starting from the 1990s [2]. The regeneration projects in the 1980s focused on the physical economic renewal of the devalued areas. Regeneration programs though depended on the stimulation of environmental improvements and economic activities with cultural and social vitality since the 1990s, especially in Britain. In this novice, a sustainability centered approach regarding urban regeneration and the focus of research, revolved to “community” and “neighborhood” [2]. The “sustainable community” concept became the agenda after these concepts gained importance. Besides the cities being physically sustainable, it is also important for the people who live in the cities to be sustainable.

In the light of the related literature, it is clear that the social factors together with the environmental and economic factors need to be taken into consideration to ensure the solutions for the urban factors and for the cities’ sustainability. Social sustainability reserves many important components like, the daily lives of people, the relationship they create with the environment, the social ties, and self-belonging senses.

It is believed by scholars that the definitions, criteria, and the measurement system of the social aspect of sustainability are still vague [2,7–11]. A comprehensive scale is missing in contemporary research that quantifies the dimensions of this concept. In this regard, the purpose of this article is to develop a sample paper to measure the cities’ social sustainability criteria.

The current paper is an original study which contributes to the field of social sustainability since it is the primary study to introduce and apply the current scale called Measurement of the City from Social Aspects (MCSA). The developed MCSA scale was applied to the city of Güzelyurt which is still experiencing immigration.

The city of Güzelyurt has remained as an intact region in relation to academic studies and very few studies were encountered during the literature review. Güzelyurt remained poor in studies, especially regarding architectural and urban studies when compared to the other cities in Northern Cyprus. It was considered necessary to review this city which faces continuous migration in the context of social sustainability. The current study contributes to the literature by providing valuable statistical data about Güzelyurt on an urban scale and also because it carries the importance of being a preliminary study of its kind to be conducted in Cyprus.

Although all the provinces faced a population increase within the territories of Turkish Republic of Northern Cyprus between the years of 2006–2011, only the Güzelyurt province, had faced a population

decrease [15,16]. According to İlseven [16], the shortage of agricultural lands, the rise in activities not related to agriculture, the disinterest in agriculture, and the uncertain future of Güzelyurt were all reasons for the people to migrate to other towns from Güzelyurt. The uncertain future of Güzelyurt is due to the fact that it has been mentioned in many plans and statements such as the Annan Plan, Perez de Cuellar, and Boutros Ghali and also in every map regarding the solution of the Cyprus issue, that which the governance of Güzelyurt was going to pass onto the Greek Cypriot Administration of Southern Cyprus [16]. Gönyeli, Nicosia, and Kyrenia were the preferred settlement areas of people who migrated from Güzelyurt [16].

With the idea of the need for local people to be sustainable for the cities' future in mind, this study focuses on the measurement of the Güzelyurt city in the context of social sustainability. This article is a part of the current doctoral research on developing a common scale to measure the dimensions of social sustainability of Güzelyurt city. In this study, the developed MCSA scale has 7 factors which are "sense of belonging", "social capital", "perceived environment", "social interactions/security", "quality of space", "satisfied with space" and "voice and influence". With the developed MCSA model, the problems in the social aspects of the cities could be revealed and solutions could be generated to ensure the social sustainability.

After the introduction section, the following section includes information about social sustainability in the urban context and its factors. The third part contains the methodology that demonstrates the case study area, scope of the study and how the factors are measured by the developed model. The fourth section of the paper presents the empirical analysis results about the developed MCSA model which includes measurement validation of the model; model fit measures, and the analytic structure of the model. The fifth section consists of the discussion and results with suggestions. Finally, the last part provides the general conclusions.

2. Social Sustainability Concept and Its Factors

Social sustainability is an important part of the overall "sustainable frame" and in urban design it became a key issue after 90s when the awareness for daily life increased [9]. It is defined in many ways such as: "The continuing ability of a city to function as a long-term viable setting for human interaction, communication and cultural development" [17]; or the "development (and/or growth) that is compatible with harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups while at the same time encouraging social integration, with improvements in the quality of life for all segments of the population" [18]. On the other hand, Davidson and Wilson [6] refer to social sustainability as a system of cultural affiliations and state that it encompasses the positive attitudes of the values and promotions of diverse cultures. Chiu [12] describes social sustainability as the conservation and development of the welfare of the present and forthcoming generations. Berkeley Group shares similar ideas with Chiu, such as "Social sustainability is about people's quality of life, now and in the future" [19]. The future generations will not be deprived due to the current conditions of the world such as "health, education, transportation, housing, and recreation" and that the future generations will have equal access to these services [20].

According to the definitions by Baines and Morgan [21] and Sinner et al. [22], social sustainability objectives are as follows: It should meet the basic human needs, overcome the capabilities related to individual inability, develop individual responsibility including social responsibility and attention to the needs of future generations, maintain and enhance the stock of social capital for increasing trust and cooperation necessary to create and support civil institutions, pay attention to the equitable distribution of development opportunities in the present and the future, and to recognize the difference of diverse cultures and communities to develop social tolerance [23].

When it comes to social sustainability in the urban aspects, there are physical and non-physical parts [9] which include public realms, housing, neighborhood and territoriality on one hand and social order and cohesion with all interactions on the other hand. Yiftachel and Hedgcock [17] declared

that “urban social sustainability is about the long-term survival of a viable urban social unit.” On the other hand, Polese and Stren [18] emphasized the reducing level of social exclusion through their definition. Ghahramanpouri, Lamit, and Sedaghatnia [7] indicate that the policies which support social sustainability must ensure cohesion by bonding the society and providing them with an advanced access to public services and recruitment. Social sustainability is defined by Cuthill [24] with the 4 following elements: social capital which is the outset for the social sustainability theory, social justice, the equality of rights, and an effective government which supports the method of participation. In their research Davoodi, Fallah and Aliabadi, [25] analyzed this phenomenon through six different aspects. These aspects are, social interaction in place, architectural identity, social security, hierarchy, participatory design, and flexibility. One year later in 2015 apart from the hierarchy criterion, Kefayati and Mostarzadeh [23] proposed five criteria as indicators for effective social sustainability which are, social interaction, architectural identity, social security, social participation, and flexibility.

The characteristics of social organization, such as knowledge of relationships within networks, obligations and expectations, trust and knowledge come together to create social capital [26]. Putnam [27] and Forrest & Kearns [28] describe social capital as indicating that the social networks and the associated norms of reciprocity are integral aspects of it and it depends on strengthening civic activities and localized empowerment with sense of community and social interaction [27]. Social capital is defined as resources embedded in one’s social networks and resources that can be accessed or mobilized through ties in the networks [29]. Dempsey [30] believes that “without social interaction, people living in a given area can only be described as a group of individuals living separate lives, with little sense of community or sense of pride or place attachment”.

It is important for the society to participate in political issues and this should not only be related to electoral matters but also to different political situations, especially at a provincial level [31]. It is also indicated that the participation of the society in political issues could be explained from three angles: “development-oriented, environment-oriented, and people-oriented”. Other dimensions such as feelings towards safety in a neighborhood and providing security are all related to community sustainability. The people who live in an area feel secure in a neighborhood which is free from crime and disorders and they feel comfortable to take part in community and interact with other people [9].

The definitions of how to achieve social sustainability in an urban environment can vary and increase. An important issue related to the investigation of social sustainability is the scale. Dempsey et al. [9] and Pennix et al. [32] support this idea as indicating that the contributing factors may show variations according to the scale such as nation and community. For example, the indicators of the developed measurement framework by the Berkeley Group were categorized in two groups as physical and non-physical [19]. The physical factors are: “decent and affordable housing, access to opportunities, high quality public services, good quality and sustainable public realms, good transportation connections” and the non-physical factors are: “safety, local social networks, social inclusion and spatial integration, cultural heritage, a sense of belonging and identity and well-being”. These factors are gathered under 4 main dimensions which are: “social and cultural life, voice and influence, amenities and infrastructure and change in the neighborhood” [19,33]. In their report called “Creating Strong Communities”, their experimental study includes 3 of the dimensions (Figure 2).

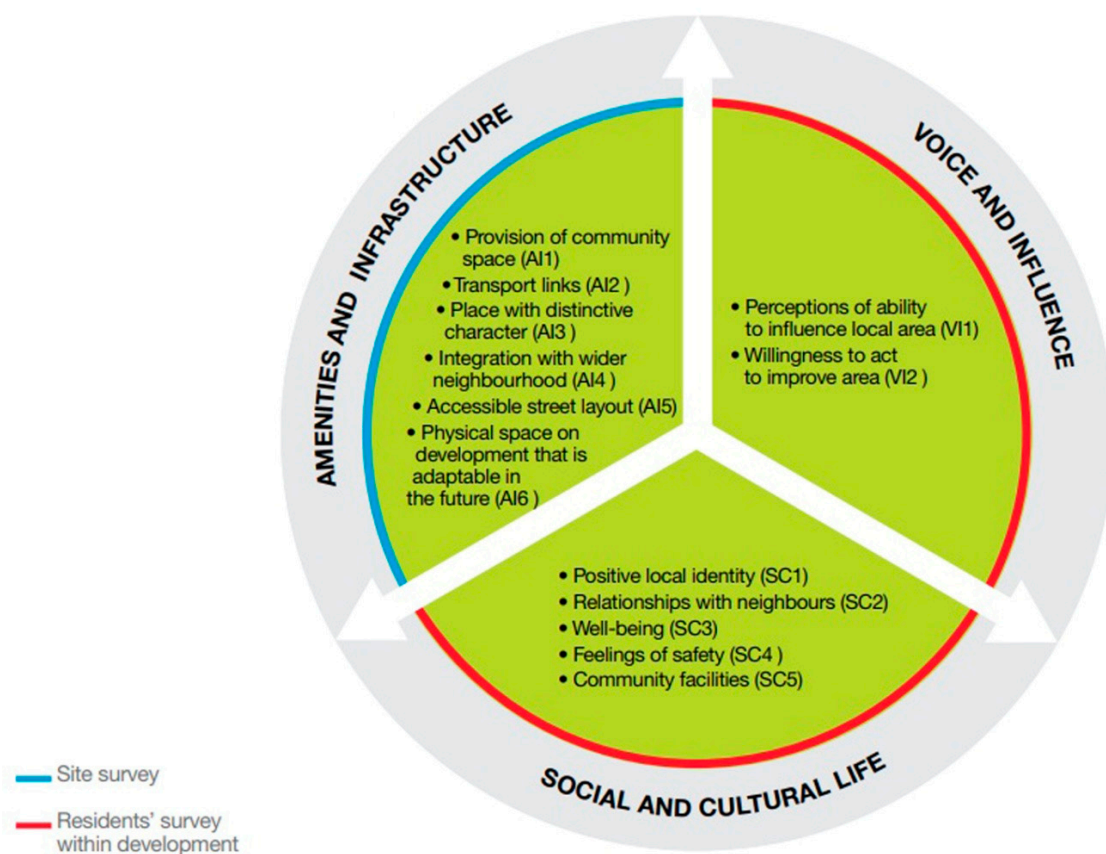


Figure 2. Framework to measure Social Sustainability [19,33].

The definitions, criteria, and the measurement system of social sustainability concept are still vague [2,7–11]. Therefore, this study aims to create a model to measure the city from the social aspects in scope of social sustainability. The field selection, scope of the study and the method is provided in the following methodology section. Detailed information about the process of the formation of the developed model to measure social sustainability is explained.

3. Methodology of Research

3.1. Case Study Area

This study focuses on the city of Güzelyurt which is in Northern Cyprus. According to the 2011 population census, Güzelyurt with its current borders has the population of 18,946 [34] and it is established on 337,000 m² land and located on the west part of Northern Cyprus [35]. This market town is 30 miles west of Nicosia, besides the Serrakhis riverbed, surrounded by orange groves and 5 miles inland from the shore (Figure 3) [35]. It is an old town, with many cultural heritages and vernacular houses.

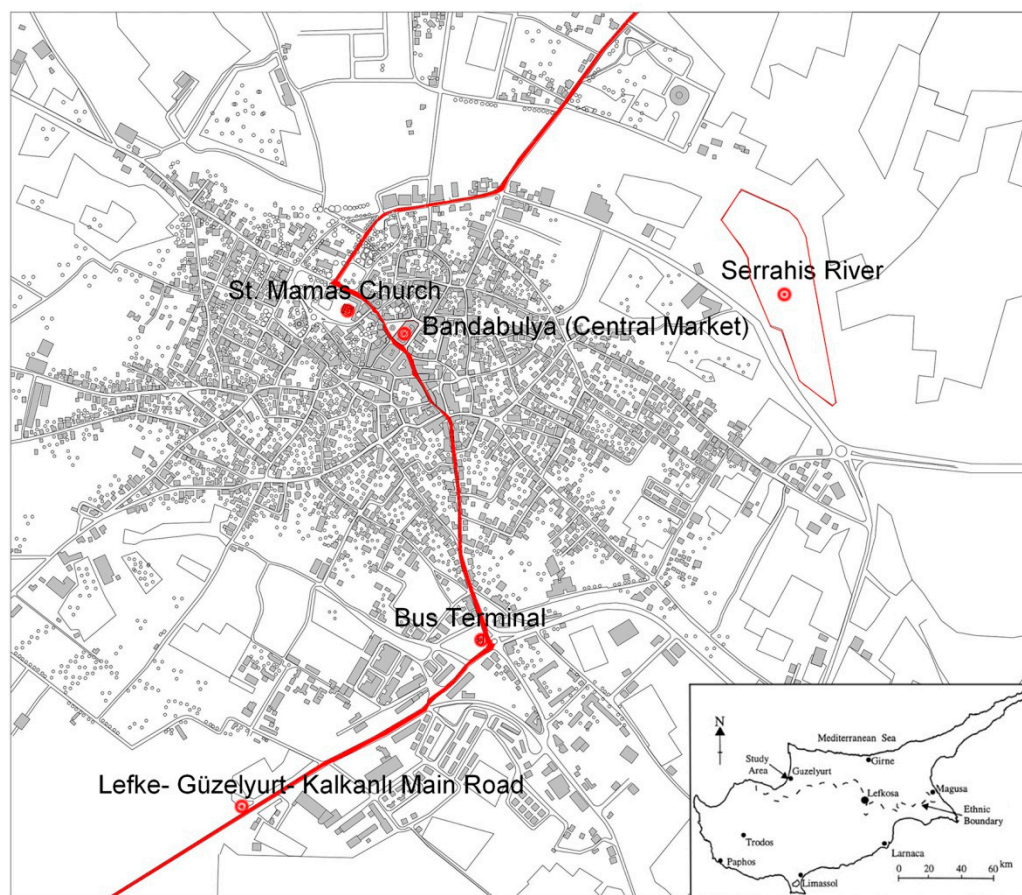


Figure 3. General Map of Güzelyurt City (Rendered by author, 2018 by adapting from Turkish Republic of Northern Cyprus Town Planning Department [36]) and its location on the map of Cyprus [37].

3.2. Scope of The Study

The research is based on the quantitative data analysis method. Face to face interviews, close talks and observations were done in the site area, whereas a questionnaire survey was conducted with local residents to measure all dimensions of social sustainability.

For the case study, the author visited different parts of the city such as shops, markets, coffee houses, municipality facilities, public buildings etc. and especially locals' houses. Local citizens were selected randomly, and they were asked to complete the survey. A total of 400 locals in Güzelyurt took part in the questionnaire survey. It took a total of 3 years to complete the study. The first 2 years was spent on thorough interviews, talks with locals, and detailed observations were done in the area to collect sufficient data. According to these, an appropriate research method was developed, and the survey questionnaire was applied in the final year between January and March 2018 in the area.

The majority of the population in Güzelyurt are forced migrated Turkish Cypriots who are originally from Kandou, Mallia, Episkopi and the neighbor villages from Limassol (Limasol), as well as some from the Paphos (Baf) area such as Poli (Polis Crysochous), and Binatlı (Kato Polemidia) [38,39]. The rest involves the locals, Turkish people who migrated from Turkey, gypsies, and university students. According to the scope of the study, the participants are limited to the locals who migrated to Güzelyurt from the South of Cyprus and the Güzelyurt residents who were born and still live in the region.

3.3. MCSA Scale Measurement

A structured questionnaire was the research instrument that used the Likert type MCSA scale with five response alternatives: strongly agree, agree, do not know, disagree and strongly disagree.

Measurement scales were established through the literature review to ensure content validity of the empirical analysis, and then 2 professors in the field of business and management, 1 professor from the department of mathematics and 1 professor from the architecture department were asked to review the adapted instrument scale. Some refinements were done in accordance to the experts' reviews and a pilot study which was conducted with a small number of Güzelyurt residents. These led to the modification and removal of some of the questionnaire items.

The current study is the primary study to develop and use the current MCSA model. In this study, the scale for social sustainability was developed based on the Berkeley Group's scale [19] and previous studies which were conducted by Bramley et al. [40], Dempsey et al. [9] and Yoo & Lee [41]. Some of the questions were modified and deleted, whereas some items were added to the scale during the development of the model. 36 itemed Likert type MCSA scale (see Appendix A) was reduced to 21 questions due to the expert views and the pilot study (see Appendix B). The developed model contains questions from Berkeley Group's [19] study which are questions 3, 4, 5, 8, and 9. The questions 1, 14 and 21 were mutually adopted from the studies conducted by the Berkeley Group [19], Bramley et al. [40] and Dempsey et al. [9]. 5 questions (7,15,20,11,13) were adapted from Berkeley Group's study and 5 questions (6, 16, 17, 18, 19) were added to the scale as a result of expert views. On the other hand, 2 questions (10, 12) from Yoo and Lee's [41] study was adopted and question number 2 was obtained from Bramley et al.'s [40] study.

To perform the analysis, the MCSA scale was used in this study. In the MCSA scale, (1) Sense of Belonging, (2) Social Capital, (3) Perceived Environment, (4) Social Interactions/Security, (5) Interaction with Space, (6) Satisfied with Space and (7) Voice and Influence scores are considered to be the dependent variables and (1) age, (2) educational level, (3) profession and (4) region migrated are considered to be the categorical (independent) variables. For the topic to be clearly understood, the dependent variables in the seven factored MCSA scale and their measurements are presented under subheadings.

3.3.1. Sense of Belonging

Sense of belonging is related to the people's feelings and this feeling consists of various dimensions. It is one of the most important dimensions of social sustainability and the measurement scale of this factor is also an important issue. In this study, the measurement of this factor is based on Bramley et al. [40] and Dempsey et al. [9]. According to the authors, the dimensions of social sustainability and the sustainability of community criteria overlap. Sustainability of community consists of five elements which are social interaction and networks, residential stability, security, participation in collective community services and pride in and sense of place [9,42]. In this regard, 5 items are set as measurements; community stability, sense of community, happiness in the city, sense of place, and sense of belonging to the house (Table 1). Four items are presented in the previous literature except the item of sense of belonging to house. According to experts' review, this new item was also included as an indicator to measure the sense of belonging factor.

Table 1. Cronbach α reliability coefficients of sub-scales.

Sub-Scale	α Value	Measure
Sense of Belonging	0.85	Community stability Sense of community Well-being/Happiness Sense of place Sense of belonging to the house

3.3.2. Social Capital

Social capital consists of dimensions about interactions between people [28] and it acts as a tool to enhance social sustainability [41]. Coleman [43] defines social capital as a structure of relations between

actors. According to Putnam [27,44], social capital refers to “features of social life—networks, norms, and trust that enable participants to act together more effectively to pursue shared objectives”. People’s relationships with their neighbors are important, as much as their sense of place. Colantonio [2] supports this by stating that happiness, well-being, and social capital started to become central in relation to social sustainability together with basic needs such as equity and employment. Some studies in the literature include 3 main elements such as networks, trust, and reciprocity to measure the social capital factor [27,41,45]. Networks between people are considered to be the core element of social capital. Also, trust in neighbors can be an essential element of this factor [43].

The scale for the sub-dimensions of social capital was mainly based on Berkeley Group’s questionnaire survey [19] and previous works and appropriate questions were identified to measure this factor. In this study, the social capital factor was measured through 4 questions such as relationship with neighbors, chatting with neighbors, trusting neighbors, and spending time with neighbors (Table 2).

Table 2. Cronbach α reliability coefficients of sub-scales.

Sub-Scale	α Value	Measure
Social Capital	0.77	Relationship with neighbors Chatting with neighbors Trusting neighbors Spending time with neighbors

3.3.3. Perceived Environment

Perceived environment is another essential dimension for the social sustainability concept that is measured through residents’ perceptions. How people live in their neighborhood, and how they use the environment is important, as much as they show pride and belonging for their settlement. Perceived environment variables were identified such as the existence of green areas, safety and maintenance in previous studies [46,47]. The scale for the elements of this factor was based on Berkeley Group’s questionnaire survey [19] and Yoo and Lee’s [41] survey. 4 questions were asked to measure the elements of perceived environment in this study (Table 3). This factor captured how people perceive their personal connection to the city in terms of their satisfaction about maintenance, transportation, sport centers, and health centers.

Table 3. Cronbach α reliability coefficients of sub-scale.

Sub-Scale	α Value	Measure
Perceived Environment	0.73	Satisfied with maintenance Satisfied with transportation Satisfied with sport centers Satisfied with health centers

3.3.4. Social Interactions/Security

Designing secure neighborhood and a sense of defense is important in a socially sustainable environment. In a sociological context, sustainability creates happiness, as well ecological balance both for the present and the future generations.

There are many university cities in the world, and in recent years Güzelyurt became one of these cities that hosts a huge amount of university students. Therefore, it is crucial to add this dimension as well to the developed model to measure the social sustainability of the city. This dimension was added to the scale in accordance with expert review’s and according to the pilot test results, some items were deleted and modified. In this developed model, two questions were identified to measure the social interactions and security factor such as trust in university students and their contribution to the city

(Table 4). Most of the cities in the world, host natives and migrants at the same time, therefore this dimension can be used for migrants instead of university students for future studies. The content of this dimension is similar to the social capital factor, but it was identified separately by the developed model. That is why it is named “social interactions and security”.

Table 4. Cronbach α reliability coefficients of sub-scale.

Sub-Scale	α Value	Measure
Social Interactions/Security	0.67	Contribution of the university students Trusting students

3.3.5. Interaction with Space/Quality of Space

Humans interact with the spaces they live in. The quality of space can either decrease or increase the possibility of interaction of people with buildings. Besides social aspects such as social capital, sense of belonging, social interactions and security etc., physical elements such as houses are important elements in the urban context. Therefore, how people live in their homes, and how satisfy they are with the home is important as much as the belonging importance they show to their homes.

According to the experts’ review, interaction with space was also important for social sustainability. Therefore, this dimension was added to the developed MCSA scale to measure social sustainability in an urban context. Two questions were identified with the experts from the architecture department to measure the elements of this indicator (Table 5) in this study. These items related to residents’ satisfaction about spatial organization of their houses and the size of their houses.

Table 5. Cronbach α reliability coefficients of sub-scale.

Sub-Scale	α Value	Measure
Interaction with Space	0.81	Satisfied with the spatial organization of the house Satisfied with the size of the house

3.3.6. Satisfied with Space

This indicator is also related with the residents’ houses and it was created with the experts’ review from the architecture department. Satisfaction of people with buildings that they live in is related to the quality of spaces. Climatic comfort conditions of houses can increase or decrease the satisfaction level of people about their homes. For measuring the features of satisfaction with space, 2 questions were asked in this study (Table 6) which were related to the climatic comfort satisfaction of residents’ during summer and during winter time.

Table 6. Cronbach α reliability coefficients of sub-scale.

Sub-Scale	α Value	Measure
Satisfied with Space	0.78	Climatic comfort satisfaction of the house during summer Climatic comfort satisfaction of the house during winter

3.3.7. Voice and Influence

Colantonio [48,49] indicated that voice and influence are vital when taking social sustainability into account which also affects governance. The author also states that social sustainability can be affected by the community due to participating in democratic matters [41]. The scale of voice and influence factor was based on Berkeley Group [19] and it was measured through 2 questions (Table 7) which were willing to work with other people and have a voice in the decisions.

The voice and influence factor can be seen under participation in collective groups and networks in the community [9] and social participation [23] in the previous studies.

Keyafati and Moztarzadeh [23] indicate that the participation and interactions in social roles and activities are social participation. One field of social capital is participating in local and community interactions [28]. This field is pertinent to social coherence and social network integration [50].

Table 7. Cronbach α reliability coefficients of sub-scales.

Sub-Scale	α Value	Measure
Voice and Influence	0.80	Willing to work with people Have a voice in the decisions

After the information about the process of the developed model, the testing of the model is conveyed to the reader. The results of the fit measures and the analytic structure of the model are provided in the following section. The analytic structure demonstrates the relation between the seven factors which create the model.

4. Analysis and Results

Measurement Validation of the MCSA Model

Wilcoxon Sing ranks test procedures which were used in determining the overall tendency of the participants regarding the total MCSA score and to find a structure affecting predictor variables, the CART (Classification and Regression Tree) method was used. Also, Kruskal-Wallis tests were used to analyze possible differences in each sub-scale scores regarding the sub-groups, Spearman's Rho correlational analysis was used to examine correlations and Chi-Square analysis was used for crosstabs.

36 item, Likert type MCSA scale (see Appendix A) with five response alternatives: strongly agree (4), agree (3), do not know (2), disagree (1) to strongly disagree (0) was first pilot tested. Since the corrected item-total correlation coefficients of items 15, 26, 32, 34 and 35 were less than 0.2 they were eliminated from the scale. To test if the revised form of the scale is factorable or not KMO and Barlett tests were used. KMO = 0.824 and $\alpha = 0.00$, values revealed that sample size was efficient in using a factor analysis for MCSA scale [51]. To decide on the rotation method, first ProMax method was tested. Since most of the correlation coefficients in factor correlation matrix were less than 0.32, varimax rotation method was used [52]. It is suggested to retain all factors that are above the eigenvalue of 1 [53]. However, it has been also argued that these criteria may result in overestimation in the number of factors extracted [54,55] therefore, the scree test in conjunction with the eigenvalues was also used to determine the number of factors to retain. In line with these, 7 factors were extracted explaining 65.13% of the total variance. Table 8 shows the factors extracted, eigenvalues and variances explained by each factor.

Table 8. Factors extracted.

Factor No	Factor Name	Eigenvalue	% of Variance	Cumulative %
1	Sense of Belonging	3.59	14.37	14.37
2	Social Capital	2.47	9.87	34.39
3	Perceived Environment	2.54	10.15	24.52
4	Social Interactions/Security	2.27	9.09	43.48
5	Interaction with Space	1.94	7.79	51.27
6	Satisfaction from Space	1.74	6.96	58.23
7	Voice and Influence	1.73	6.90	65.13

Six more items, namely item 5, 14, 29, 30, 31, and 33, were eliminated from the scale as they have factor loading less than 0.32.

The 7-factor model was tested in terms of model fit using confirmatory factor analysis. Fit measures are shown in Table 9. χ^2 is a classic goodness of fit measure to determine the overall model fit. A large

χ^2 means that model estimates do not sufficiently reproduce sample covariance; the model does not fit the data well. By contrast, a small χ^2 is a sign of a good model fit [56–58].

Due to some drawbacks of χ^2 test, many alternative fit statistics have been developed [59]. When the number of variables increases χ^2 may get larger. Therefore, using χ^2/df value is suggested. A χ^2/df values less than 3 is a sign of good model fit [60] and the MCSA model satisfies this condition, $\chi^2/\text{df} = 2.59$.

Another commonly used statistic is the Root Mean Square Error of Approximation (RMSEA), a measure of fit introduced by Steiger and Lind [61]. RMSEA “incorporates a penalty function for poor model parsimony” and thus becomes sensitive to the number of parameters estimated and relatively insensitive to sample size [56]. A value of the RMSEA of about 0.05 or less would indicate a close fit of the model in relation to the degrees of freedom [62]. In this study, RMSEA value of the last model is 0.053 which shows that the model has a good fit.

Table 9. Model fit measures after correction.

Model Fit Measure	Original Measures	Model 1	Model 2	Model 3
		F1 *–F2 Joined F1–F7 Joined	Item 4 Deleted F2–F7 Joined	Item 3, Item 5 and Item 9 Deleted
χ^2	1116	835.60	691.60	455.49
p	0.000	0.000	0.000	0.000
χ^2/df	4.15	3.14	2.86	2.59
RMSEA	0.089	0.073	0.068	0.053
CFI	0.769	0.858	0.880	0.910

* F1: Sense of Belonging, F2: Social Capital, F3: Perceived Environment, F4: Social Interactions/Security, F5: Interaction with Space, F6: Satisfaction from Space, F7: Voice and Influence.

Comparative fit index (CFI) evaluates “the fit of a user-specified solution in relation to a more restricted, nested baseline model,” in which the covariance among all input indicators are fixed to zero” or no relationship among variables is posited [56]. CFI values ranging from 0.90–0.95 are accepted for good model fit [58,60,63]. In this study, CFI value of the MCSA model is 0.91 which shows that the model has a good fit.

The confirmatory factor analysis led us to eliminate items 4, 3, 5 and 9 and the final structural model was obtained as shown in Figure 4 (see Appendix B for the final version of the MCSA scale). The construct validity of the 7-factor scale was met because as seen in Figure 4, all factor loadings are greater than or equal to 0.60 [64]. Discriminant validity check was done by comparing the Average Variance Extracted (AVE) with the squared correlation for each of the constructs. As seen in Table 10, the AVE of each latent variable is higher than the squared correlations between the latent variable and all other latent variables [65] (Table 10).

The Stratified Cronbach α value of MCSA scale was 0.90. Total correlation coefficients of all items were greater than 0.2 [66,67] in this model. The Cronbach α values of the sub-scales of MCSA scale is shown in Appendix C. Alpha was developed by Lee Cronbach in 1951 [68] to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test [69].

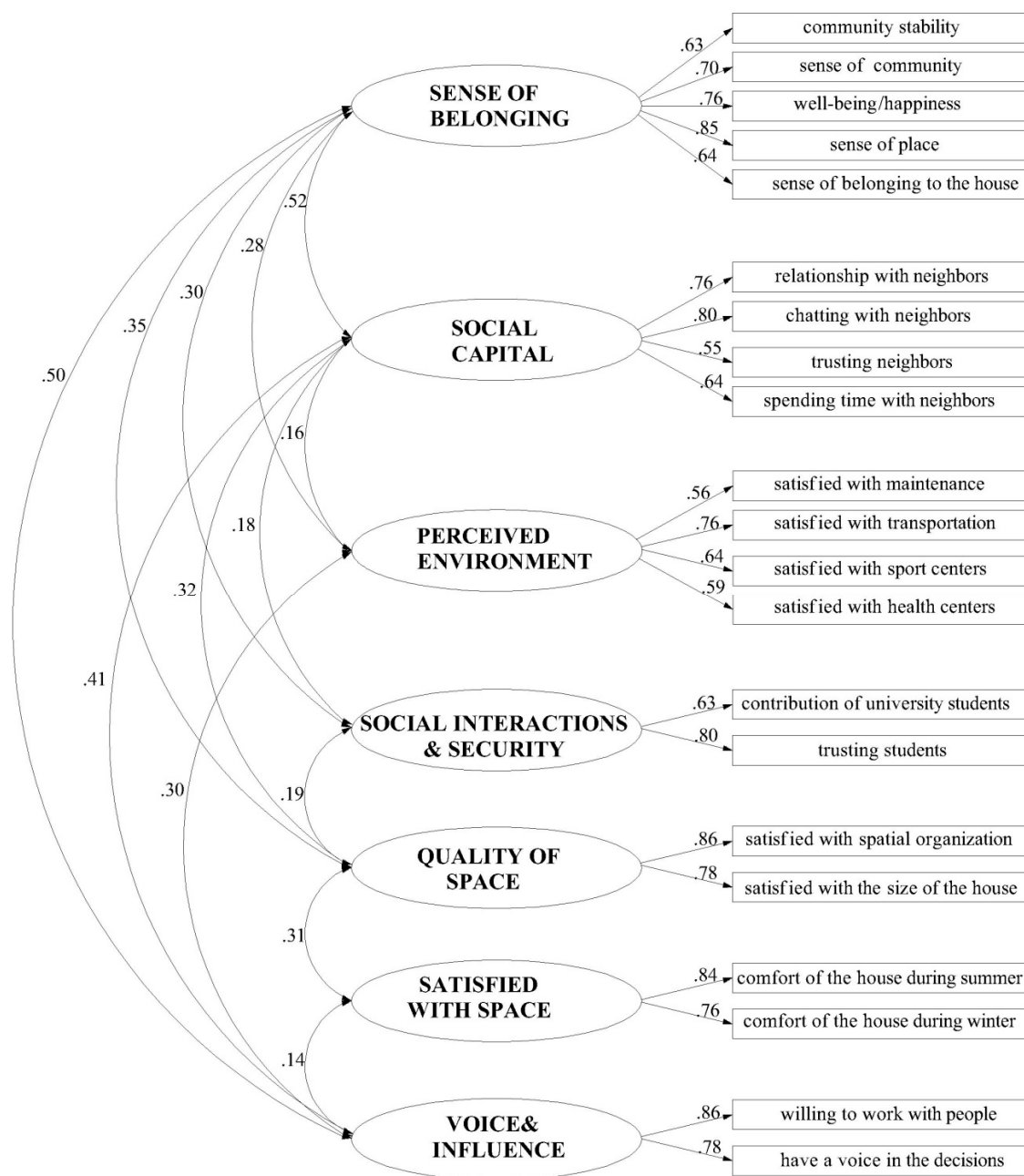


Figure 4. Analytic Structure of the MCSA Model.

Table 10. Comparison of AVE and Square of Inter-Factor Correlations.

Factor—AVE	1.	2.	3.	4.	5.	6.	7.
1. Sense of Belonging—0.52	-	0.08	0.27	0.09	0.12	0.02	0.25
2. Social Capital—0.48	-	-	-	0.03	0.10	0.001	0.17
3. Perceived Environment—0.48	-	-	0.02	0.00	0.008	0.01	0.09
4. Social Interactions/Security—0.52	-	-	-	-	0.03	0.004	0.05
5. Interaction with Space—0.64	-	-	-	-	-	0.09	0.04
6. Satisfaction from Space—0.68	-	-	-	-	-	-	0.02
7. Voice and Influence—0.67	-	-	-	-	-	-	-

5. Findings and Discussion

The aim of this study was to develop a model to measure social sustainability and this is what makes it different than the existing studies in the literature. The report called “Creating Strong Communities” by the Berkeley Group [19] which presented a developed scale to measure the social sustainability of new housing triggered the idea to conduct the current study. Apart from a city to be physically sustainable, the idea for the residents to also be sustainable regarding the city was the starting point to conduct the current study. The Berkeley Group proposed 4 main dimensions for social sustainability such as “social and cultural life, voice and influence, amenities and infrastructure and change in the neighborhood” [19,33]. However, their experimental study included 3 of the dimensions. Although a scale was proposed, there was not a suggested model.

On the other hand, Yoo and Lee [41] conducted an experimental study in Seoul in 2016 to identify the effect of the built environment on social sustainability and social capital with a suggested model, but the suggested factors to measure social sustainability were limited and the main focus was not given to create a model which measured directly social sustainability.

The theoretic studies conducted by Bramley et al. [40] and Dempsey et al. [9] to define urban social sustainability, support the idea that the dimensions of social sustainability and the sustainability of community criteria overlap. These studies suggest 5 elements for sustainability of community which are social interaction and networks, residential stability, security, participation in collective community services and pride in and sense of place.

Various theoretical and experimental studies which measure the elements regarding sense of belonging, social capital, participation, perceived environment exist in the literature. For example, James Coleman, Robert Putnam, Pierre Bourdieu [70] and Lin are the pioneers to the identification and theorization of social capital. Factors such as social capital, sense of belonging, participation and perceived environment took place separately and sometimes together in studies. Apart from these, Bramley et al., [40], Dempsey et al., [9] and Colantonio [2] mentioned about these elements together with urban social sustainability. Although these studies are on an urban scale, the significantly important architectural elements related to the houses’ qualities and climatic comfort satisfactions were not studied in this context. After studying various theoretical and experimental studies, the idea for the need to include data related to the houses emerged. The current study has gathered the factors regarding social sustainability through the literature review and the recently suggested factors under a single framework. A model which provides the relations between all the suggested factors and enables measurement of social sustainability on an urban scale was developed. Thus, the problems related to the social aspects of the cities could be evaluated through this scale by providing solutions to ensure social sustainability in cities.

As mentioned before, the starting point of the current study is the belief that the social sustainability of a city is not only related to the physical aspect of the city but also to the sustainability of the local people. There is an existing ongoing migration problem in the chosen city of Güzelyurt. In this context, the problems regarding the social aspects of the city could be identified through this model and solutions for the problems could be generated. Action could be taken by developing solutions with this scale, towards the city of Güzelyurt and also in other cities encountering similar problems. Surely, it will not be enough to only consider the social aspects of a city to generate sustainability. For this reason, the social aspects were considered in the context of the current study and a model was developed. The forthcoming studies could also consider the economic and environmental factors together with the social aspects to develop a model. Thus, this comprehensive model could measure all the dimensions of a city simultaneously.

6. Conclusions

Social sustainability is one of the three core elements of sustainable development. The absence of a consensus regarding the definition, criteria and the measurement of the concept was a significant criterion for conducting this study. The main objective of the current study was to create a scale to

measure social sustainability on an urban scale to fill the gap in the literature. For this reason, the current study suggested a model called MCSA to measure social sustainability within an urban scale and this model was examined empirically in the city of Güzelyurt. In the MCSA scale, dependent variables are considered to be “Sense of Belonging”, “Social Capital”, “Perceived Environment”, “Social Interactions/Security”, “Interaction with Space”, “Satisfied with Space” and “Voice and Influence” and age, educational level, profession and region migrated are considered to be the categorical (independent) variables.

The MCSA scale was developed through the literature review and expert views. According to the pilot study and the expert views 36-item Likert type MCSA scale was modified. In addition to them, confirmatory factor analysis was conducted to measure the model’s fit measures. Also, the construct validity and the discriminant validity of this model were tested. As a result, some items were removed from the scale and with 21 items, 7 factors were extracted. Analysis results indicate that the developed model has a good fit and it works. In other words, this model can be applied for other cities to measure the dimensions of social sustainability.

The current study acts as an example for the other cities suffering from problems regarding social aspects. The city of Güzelyurt and the other cities encountering the similar problems could take action towards them and develop solutions with this scale. It is believed by the authors that social sustainability in the cities can only be reached by the contribution of local residents. To be able to reach this goal, municipalities on the local scale and government on the general scale should take immediate action towards the social issue.

Author Contributions: As a corresponding author, F.U.D. has initiated and completed this study including the conceptualization, methodology, writing—original draft preparation, visualization and writing—review and editing. L.A. as second author, did the supervision for this study, she has reviewed and finalized the manuscript. Both authors have read and approved the final manuscript.

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Appendix A

Survey Questionnaire for Residents

My name is Feriha Urfalı. This study is being conducted by me in the scope of my PhD at the European University of Lefke at the Architecture Department. The aim of this short survey is to investigate the social and architectural development of the Güzelyurt region after 1974.

This survey will not take you more than 5 min to respond and all your answers will be kept confidential. The survey data will only be used in the scope of my doctoral dissertation and will not include participant names. I will appreciate your contribution.

Age:					
Gender:	(A) Female		(B) Male		
Nationality:	(A) TRNC				
Education:	Primary	Secondary	High	University	
Occupation:					
Number of family members:	(A) 1 (B) 2 (C) 3 (D) 4 (E) more than 4				
Income:	(A) low income	(B) middle	(C) high income		
Place of birth:					
Migration area from the South Part/Other:					
Date of Migration:					
Region that you are living now:	Market place (city center)		social housing dwelling		
I have been living in Güzelyurt for:	(A) 5–10 year	(B) 10–20 year	(C) 20–30 year	(D) 30–40 year	(E) over 40 year
Are you Landlord of the house or a tenant?	(A) Landlord		(B) Tenant		

	Strongly Disagree	Disagree	Do not know	Agree	Strongly Agree
1. I want to live in this region for more years.					
2. I feel a sense of belonging as member of community.					
3. I feel safe while walking around in my neighborhood during the day.					
4. I feel safe while walking around in my neighborhood at night.					
5. The crime rate is high in my neighborhood.					
6. Friendship in my neighborhood is important for me.					
7. I usually chat with people in my region.					
8. The majority of the people in the region are trustable.					
9. I usually chat with the university students in the region.					
10. I think university students have positive contributions to Güzelyurt.					
11. The majority of the university students in my region are trustable.					
12. I am willing to work with people to improve my region.					
13. I would like to have a voice in the decisions affecting my region.					
14. I am satisfied with the built environment of neighborhood (construction of new apartments).					
15. There is an air pollution in the region.					
16. I am satisfied with maintenance of neighborhood.					
17. I am satisfied with the transportation network in the area.					
18. I am satisfied with the quality of sport facilities in my local area.					
19. I am satisfied with the quality of the health care organizations in my local area.					
20. I feel a sense of belonging to the region that I am living.					
21. I feel a sense of belonging to the house that I am living.					
22. I am satisfied with the spatial organization of my house.					
23. I am satisfied with the size of my house.					
24. I am satisfied with the climatic comfort of my house during summer time.					
25. I am satisfied with the climatic comfort of my house during winter time.					
26. I preferred to have a voice during design process of my house.					
27. I like to spend time with my neighbors in my garden/veranda/balcony.					
28. There are places for the local people to come together for generally socializing.					
29. I use Güzelyurt bazaar for my daily needs.					
30. I generally go to Open Bazaar for shopping on Saturday.					
31. I use Terminal for transportation.					
32. The political uncertainty of the region disturbs me.					
33. I did investment in the area I live in.					
34. I did investment to another area.					
35. There is visible population decrease of local people in the region since 1974.					
36. I am happy with the area that I am live in.					

Appendix B

Age:					
Gender:	(A) Female		(B) Male		
Nationality:	(A) TRNC				
Education:	Primary	Secondary	High	University	
Occupation:					
Number of family members:	(A) 1 (B) 2 (C) 3 (D) 4 (E) more than 4				
Income:	(A) low income	(B) middle		(C) high income	
Place of birth:					
Migration area from the South					
Part/Other:					
Date of Migration:					
Region that you are living now:	Market place (city center)			social housing dwelling	
I have been living in Güzelyurt for:	(A) 5–10 year	(B) 10–20 year	(C) 20–30 year	(D) 30–40 year	(E) over 40 year
Are you Landlord of the house or a tenant?	(A) Landlord			(B) Tenant	

	Strongly Disagree	Disagree	Do not know	Agree	Strongly Agree
1. I want to live in this region for more years.					
2. I feel a sense of belonging as member of community.					
3. Friendship in my neighborhood is important for me.					
4. I usually chat with people in my region.					
5. The majority of the people in the region are trustable.					
6. I think university students have positive contributions to Güzelyurt.					
7. The majority of the university students in my region are trustable.					
8. I am willing to work with people to improve my region.					
9. I would like to have a voice in the decisions affecting my region.					
10. I am satisfied with maintenance of neighborhood.					
11. I am satisfied with the transportation network in the area.					
12. I am satisfied with the quality of sport facilities in my local area.					
13. I am satisfied with the quality of the health care organizations in my local area.					
14. I feel a sense of belonging to the region that I am living.					
15. I feel a sense of belonging to the house that I am living.					
16. I am satisfied with the spatial organization of my house.					
17. I am satisfied with the size of my house.					
18. I am satisfied with the climatic comfort of my house during summer time.					
19. I am satisfied with the climatic comfort of my house during winter time.					
20. I like to spend time with my neighbors in my garden/veranda/balcony.					
21. I am happy with the area that I am live in.					

Appendix C

Table A1. Cronbach α reliability coefficients of sub-scales.

Sub-Scale	α Value	Measure
Sense of Belonging	0.85	Community stability
		Sense of community
		Well-being
		Sense of place
		Sense of belonging to the house
Social Capital	0.77	Relationship with neighbors
		Chatting with neighbors
		Trusting neighbors
		Spending time with neighbors
		Satisfied with maintenance
Perceived Environment	0.73	Satisfied with transportation
		Satisfied with sport centers
		Satisfied with health centers
Social Interactions/Security	0.67	Contribution of the university students
		Trusting students
Interaction with Space	0.81	Satisfied with the spatial organization of the house
		Satisfied with the size of the house
Satisfied with Space	0.78	Climatic comfort satisfaction of the house during summer
		Climatic comfort satisfaction of the house during winter
Voice and Influence	0.80	Willing to work with people
		Have a voice in the decisions

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