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Analyzing Satisfaction in Residential Open Space

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Abstract

This research has been conducted to investigate the most important criteria in the dwelling environment influenced residents' satisfaction. The meaning of the yard has been changed to the semipublic open space, following the emergence of multi-families complex as one of the prevalent sort of habitation in the big cities of Iran. Therefor the features of residential open space which effect on habitants' perception and consequently, residents' satisfaction was studied.

This paper is based on the data collected from the questionnaire contained sections measuring residents' perceptions of space in eleven residential complexes in Tehran. The path model analysis had spatial, contextual, functional and social features as the exogenous variables predicting residents' evaluation of open space and the level of satisfaction.

The structural equation modeling implied that overall residents' satisfaction was associated intensively with the spatial feature of complexes. Sense of privacy, coherence and safety are the most important features affect residents' satisfaction, whereas social and functional features do not have vital effect on habitant perception of satisfaction.

Keywords

Open Space, Satisfaction, Structural Equation Modeling

1 Introduction

Yard was one of the most important parts of the Iranian traditional house. Lots of activities depending on the climatic situation were occurring there. Open spaces as complementary part of building mass, adjusting building and human density. In the contemporary urbanism, according to the land and economic limitations, whereas home's inner spaces have been decreased, shared common spaces have been increased. Thus, Privet courtyard for most of the families is not affordable. Small apartments request more using of open space, even though the function of the yard has declined to the more functional activities such as: car parking, Light and ventilation hole. Public space in the contemporary city is considered more as a secondary space, owned neither by the individual nor by the public (Abu-Ghazze 1996), although it should cover a huge part of everyday activities. Appropriate design of public open space, will change the living quality and consequently, residence's perceptions of the total space of the complex.

Creation of a multidisciplinary conceptual framework of environmental feature and quality of life is required to advance the field of Architecture, urban development, environmental design (van Kamp, Leidelmeijer, Marsman, & de Hollander 2003). There is limited understanding of how physical environments influence neighborhood satisfaction (Kweon, Ellis, Leiva, & Rogers 2010). It is complicated by the fact that it is affected by variety of factors rooted in economic, cultural and social approaches and also household background variables. Respecting these aspects this paper would focus on the relationship between residential complexes and place satisfaction. Where the main question is which criteria have the most important effect on residents stated neighborhood satisfaction. To answer these questions, an ideal approach would aggregate key elements into different typology neighborhood complexes.

Thus, the position of Open space in Iranian residence is introduced, followed by the influential criteria on the residential satisfaction. The next section details the empirical methods and procedures, where the procedure of selecting complexes to survey research is presented. Then, the evaluation model is established based on Structural equation modeling (SEM). The empirical results are discussed as the next in two parts, including finding the most important criteria effect on residents' satisfaction and investigating satisfaction in different residential layout.

1.1 Residential Open Space

Lots of activities according to the culture and climatic situation were occurred there. Memarian (1993) identified six main functions for courtyard, by references to variations of types in Iran, including demarcation of limits of property, definition of a place of privacy for the family, unification of the spaces and elements, provision of a circulation, creation of a garden or a cool place and finally promotion of ventilation. All or combinations of different functions were used in the traditional Iranian courtyard. Haeri (2010) by analyzing varied houses in the six big cities in Iran, classified open spaces in the traditional house in distinct levels, including courtyard, Terrace, Sharemi, Mahtabi and roof as shown in Fig. 1, Even though the combination of all listed levels is not prevalent. In the traditional courtyard houses in the center of Iran, a family may spend much of their time in the semi-open space in the south- eastern ended of the courtyard(2006: 23), where inside and outside spaces combined together through medium spaces such as Ivan, Mahtabi.

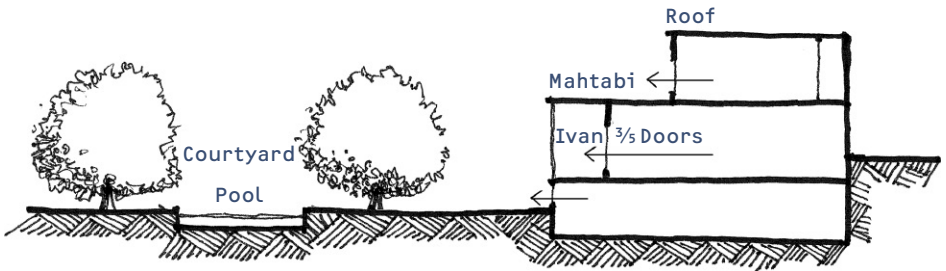


Fig. 1: Different types of open space in the Iranian traditional house

Late Pirnia(1988), the prominent Iranian architectural historian, claimed that by increasing the main central part of buildings, it was built coverless and turned into the courtyard. Afterward, the structure of the house was built based on the position of the courtyard, according to the Fig. 2. Some spaces of the house were named considering their openness to the courtyard such as Se-Dari (three doors) or panj-Dari (five doors) rooms. While more than a family lived in a house, sequential connected courtyards were built.

This type of house was transformed to the different style and structure in the 1930s (Alemi 2002), when cars were entered to the Iranian transportation habit. The implementation of the first Tehran comprehensive plan, at the beginning of 1960s, confirmed the position of the car inside the houses. Nowadays, the location of the cars is so important that some prominent Iranian architects such as Haeri (2010) called the residential open space as a place for car or the connection between street and parking instead of the courtyard. In the contemporary city, streets have found a significant position, where buildings are following the patterns of the streets.

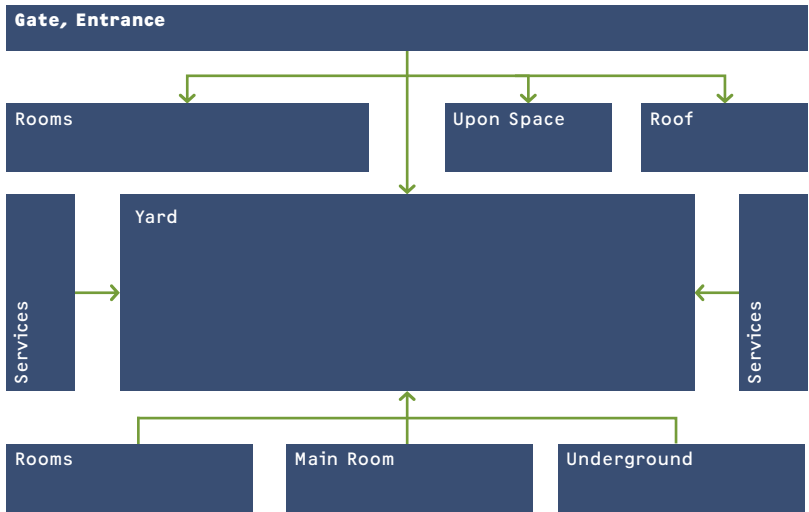


Fig. 2: The structure of the traditional house and sequence of space (Haeri 2010: 103)

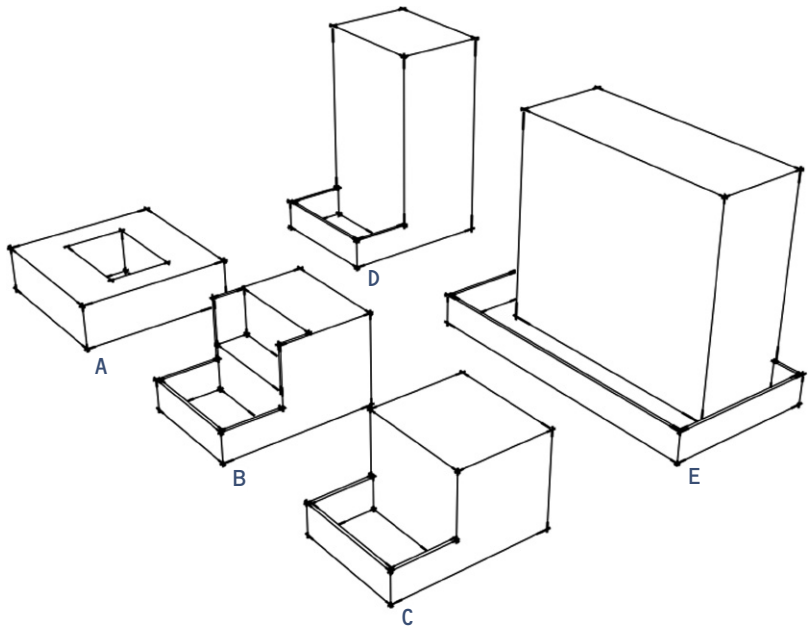


Fig. 3: The changing pattern of the building form (A) Inward courtyard house (B) Outward medium-rise house with huge balcony (C) Outward medium-rise house (D) High-rise apartment buildings (E) Large scale apartment building

Meanwhile, the organisatory task of the courtyard has wiped out by moving its location to the edges of the parcel. According to the new urban regulation, the building should be concentrated at the one side of the site, and the rest allocates to the courtyard, thus built area should not exceed more than 60% of the land. Hence, the central courtyard has been almost eliminated from the newly constructed houses. Some cases of the contemporary houses built according to the municipality's regulations were shown in figure 4; the first two models are the most prevalent layout. Constructing big residential complex gives the opportunity to break this rule and build different layouts. The very reason to choose this scale as case studies. Previous research in Tehran (Einifar & Ghazizadeh 2010) indicated three dominant types of arrangement comprising concentrated, row and diffuse blocks.

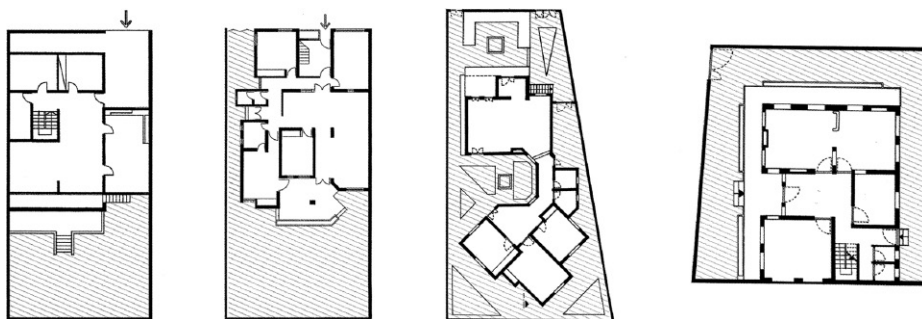


Fig. 4: Types Of Built Area (Haeri 2010: 135)

1.2 Residential Satisfaction

Generally, residential satisfaction is considered as one of the criteria of residential quality, Neighborhood satisfaction is an important component of life satisfaction (Kweon et al. 2010). The main object of this research is determining which criteria in residential environment increase user's satisfaction. Based on this approach satisfaction has been a subject of much research in different levels. Canter and Rees (1982) considered residential environment as linking three components: neighborhood, house and neighbors. Amol (2009) following Canter and Rees (1982) and identified three levels comprising bedroom, floor, and hall, estimating student's satisfaction from their dormitory. Adriaanse (2007) found that single housing scale could be divided into three sub scale as follows: internal neighborhood reputation, social climate and dwelling satisfaction. Rioux and Werner (2011) drew on four domains of: home, neighbors, local area, and access to services to predict aging people satisfaction.

It can be argued that designers should take into account not only the needs but also the perceptions of the resident in order to create a more harmonious residential environment, maximizing comfort with the resources

at their disposal (Maria Amérigo & Aragonés 1990). Corresponding other researchers (Bonaiuto, Aiello, Perugini, Bonnes, & Ercolani 1999; Canter & Rees 1982; Rioux & Werner 2011), it is assumed that the residences should not isolate from their social and physical surrounding. Following Canter (1982), Francescato(1989), Amérigo and Aragonés (1997) were predicting residential satisfaction needs a multi-faced structure, including (architecture, urban form), social (people and social relationships) and functional features (services and facilities) in their conceptual frameworks. Bonaiuto and his colleagues (2003, 2006) added the fourth feature or contextual factor, including pace of life, environmental health and upkeep and care to the conceptual framework.

A main attempt to determine the residential satisfaction in Iran was a case of housewives residing in a neighborhood of Tehran considered new residence planned by Navab urban renewal. Rafieian research (2008) implied that the intangible attributes such as security, cleaning and sociability of neighbors are more effective on residence satisfaction then facilities, accessibility and physical features.

2 Materials and Methods

The approach to the study was the combination of qualitative and quantitative, and the survey method was used. To ensure a satisfying experience for the residents and the quality of design and environment improvement, researchers not just rely on their own proficiency but also consider residents' response (Zhang & Lin 2011, p.11). So residence's evaluation from their site was asked through a questionnaire.

2.1 Conceptual Model

Correspondent with previous research, the present project examines residents' satisfaction with their Open space, their home, and their relations with neighbours. The conceptual framework of this research has risen based on the Bonaiuto and his colleagues' (2003, 2006) multi-faced structure, including spatial, social, functional and contextual features. A few researchers have considered residential open space as a semipublic space comprising hard and soft landscape. Regarding the nature of semi-public spaces and cultural background, different criteria for evaluation the level of satisfaction should be applied.

Spatial assessment should be considered through surveying various groups of people. Visual (and spatial) information has a special relationship to human thought (Kaplan & Kaplan 1989). A pleasing appearance is not associated with any housing style, but rather with variety in building height and facades, color, good landscape, pleasant views and high levels of maintenance (Marcus & Sarkissian 1986: 46). So, physical attractiveness can increase residential satisfaction. In present research, the spatial features were assessed from three main factor comprising privacy, naturalness and coherence. Coherence and naturalness were two of the nine key visual concepts of Tveit and Fry's category (2009; 2006) for analyzing sight landscape feature.

The third factor, privacy, rooted in Iranian culture. Therefore, was chosen for assessment dwelling environment. Privacy is a general concept relating to controlling over intrusion of all kinds: unwanted callers, people looking in at the windows, neighbors listening to family conversations, or noise and traffic (Altman 1975). The courtyard offered some measure of privacy if psychological security and sense of privacy from both intrusion and observation are obtained (Girling & Helphand 1994, p.29). Different perception of privacy by people, considering their background, implies on relativity of privacy. In

comparison with the Iranian traditional life, the new residential open spaces are more assumed as semi private and even public space. Hence, the meaning of privacy has lessened gradually to the condition where people can be there without interference by other. This in turn will depend on residents' expectations of what the extent of their territory should be and the intrusions upon it that they sense (Abu-Ghazze 1996, p.205). Naturalness was perceived closeness to a preconceived natural state (Abraham, Sommerhalder, & Abel 2010; Fry et al. 2009) As a gregarious species, people advantage emotionally and physically from interpersonal relationships (Antonio 2004). In urban environment, the experience of nature within the city enhances well-being (Hunter 2011), supports health (Boiral & Henri 2012), introduces the critical issue of social capital (Antonio 2004), increase sense of safety (Kuo, Bacaicoa, & Sullivan 1998) and inspires Iranian traditional courtyard. Coherence is the most-used concepts in landscape aesthetics describing the unity of a scene, repeating patterns of color and texture and correspondence between land use and natural conditions (Fry et al. 2009). Visual coherence can also be defined as the lack of disturbance (Tveit et al. 2006). The amount and arrangement of landscape components make a difference in neighborhoods satisfaction (Kweon et al. 2010: 515). Therefore, residents' evaluation of main parts of residential landscape component was asked. This conceptual framework is shown in Figure 5.

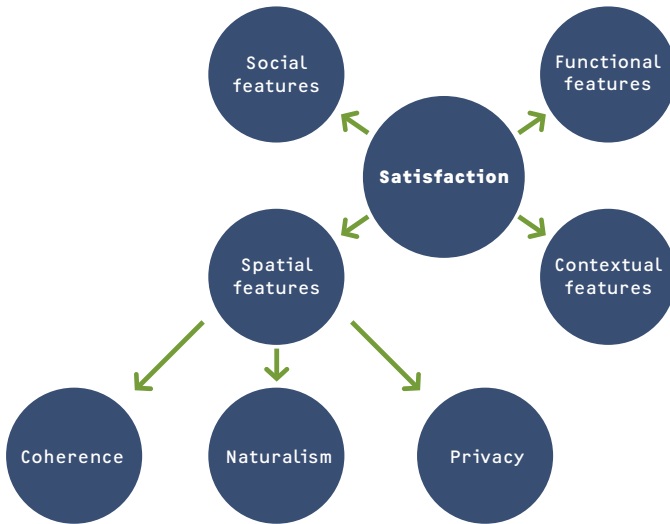


Fig. 5: Conceptual model of evaluating residential satisfaction

2.2 Study site and participants

The purpose of this research is investigating the relationship between different quality of Open space and the place satisfaction. Therefore, eleven complexes were selected as case studies for evaluating the theoretical framework.

According to Einifar and Ghazizadeh (2010) residential typology layout based on the arrangement, scale and height, one sample from each type was chosen. All complexes have different spaces with similar functions, including access path, green space, and sport and playground space. Parking was allocated in the open space in all samples.

2.3 Data collection procedures

The mixture of 38 open and closed-ended, self-administered questions were designed to collect the required data. The questionnaire included 13 items about the respondents' demographic data, 11 items about the residential open space attributes, six items about attitudes towards social aspects and six items about functional and contextual attributes and one item about satisfaction of complexes. At the last question, people were asked to show the most used, pleasant and unpleasant place on the map with defined signs.

Data were collected over the winter and spring of 2011. Approximately, 1,000 questioners were distributed at entrance of selected residential complexes by the researcher on working day's evening. At first, project aims was defined and questionnaire was briefly described and respondents were asked to give it back to the entrance guard in three days. Totally, 265 completed questionnaires returned.

2.4 Statistical Analysis

This research uses AMOS 17.0 analysis software to establish a structural equation modeling (SEM) and uses maximum likelihood estimation to do a confirmatory factor analysis. SEM is also known as the causality model, covariance structural model, or AMOS model. It is a multivariate statistical analysis technique for establishing, estimating and testing the causality model. It includes a series of multivariate statistical analysis approaches, such as multiple regression, factor analysis, path analysis and multivariate analysis of variance. It is a very generic, linear statistical modeling technique, which tests hypotheses in accordance with theories (Liping, Yuqing, Yuntao, & Yishan 2009). The measuring model mainly measures the corresponding relationship between the latent variables and significant variables.

The path model had physical measures of spatial, social, functional features as the exogenous variables predicting resident satisfaction. Overall neighborhood satisfaction was associated with perception of satisfaction with the attributes of the environment. In order to convergent validity of the model, all the loading factor coefficients in the SEM less than 0.4 were filtered. After selecting the appropriate estimate option and estimating the measuring model, a standardized estimate SEM and corresponding model output indicator data were gotten using the generalized least square's method of parameter estimation.

3 Results

The path model had physical measures of spatial aspect and social and functional features as the exogenous variables predicting resident evaluation of environment, General neighborhood satisfaction. As hypothesized, overall neighborhood satisfaction was associated directly with the physical measure of the environment and indirectly with the social and contextual indexes.

A Value of at least 0.90 is required to accept a model, while a value of at least 0.95 is required to judge the model fit as good (Hox & Bechger 1998, p. 9). Different models were pooled all together to determine the best-fitting measuring model. The value obtained in the remaining index lead to consider the model's fit as satisfactory. After selecting the appropriate estimate option and estimating the measuring model, a standardized estimates structural equation model and corresponding model output indicator data were obtained. Fitting analysis shows Chi-square (df) = 287.95 (250), p-Value = 0.50 > 0.01, GFI = 0.909 > 0.9, CFI = 0.936 > 0.90 and RMSEA = 0.024 < 0.050. Checking the model showed there are no negative errors in standardized estimates' structural equation model, and that the path coefficients are positive. The whole model is presented in Figure 6.

Satisfaction components were measured via Likert's five-item scale, through three main questions. Respondents were asked (a) was there a favorite place for them? (b) How much did they prefer this place to other places? And (c) do they recommend this place to others? A new factor was calculated based on these three loading factors in order to evaluate the overall satisfaction. Factor loading of favorability, preferability and recommendatory of the place have approximately same value 0.54, 0.60 and 0.57. Overall neighborhood satisfaction has the largest association with resident's satisfaction with spatial features (Loading factor = 0.93), followed by resident satisfaction with contextual features (L.F. = 0.59). Resident satisfaction with social (L.F. = 0.41) and functional features (L.F. = 0.38) were considered to be a relatively unimportant aspect in overall satisfaction. Although community in a neighborhood through neighborhoods with ecological designs are likely to also have greater sense of community (Rogers & Sukolratanametee 2009),

Structural equation modeling showed that privacy and coherence have the same weight on evaluating spatial features, followed by Naturalness. Even though, the meaning of privacy has gradually changed and people expectation of privacy is not the same as before, sense of privacy is still es-

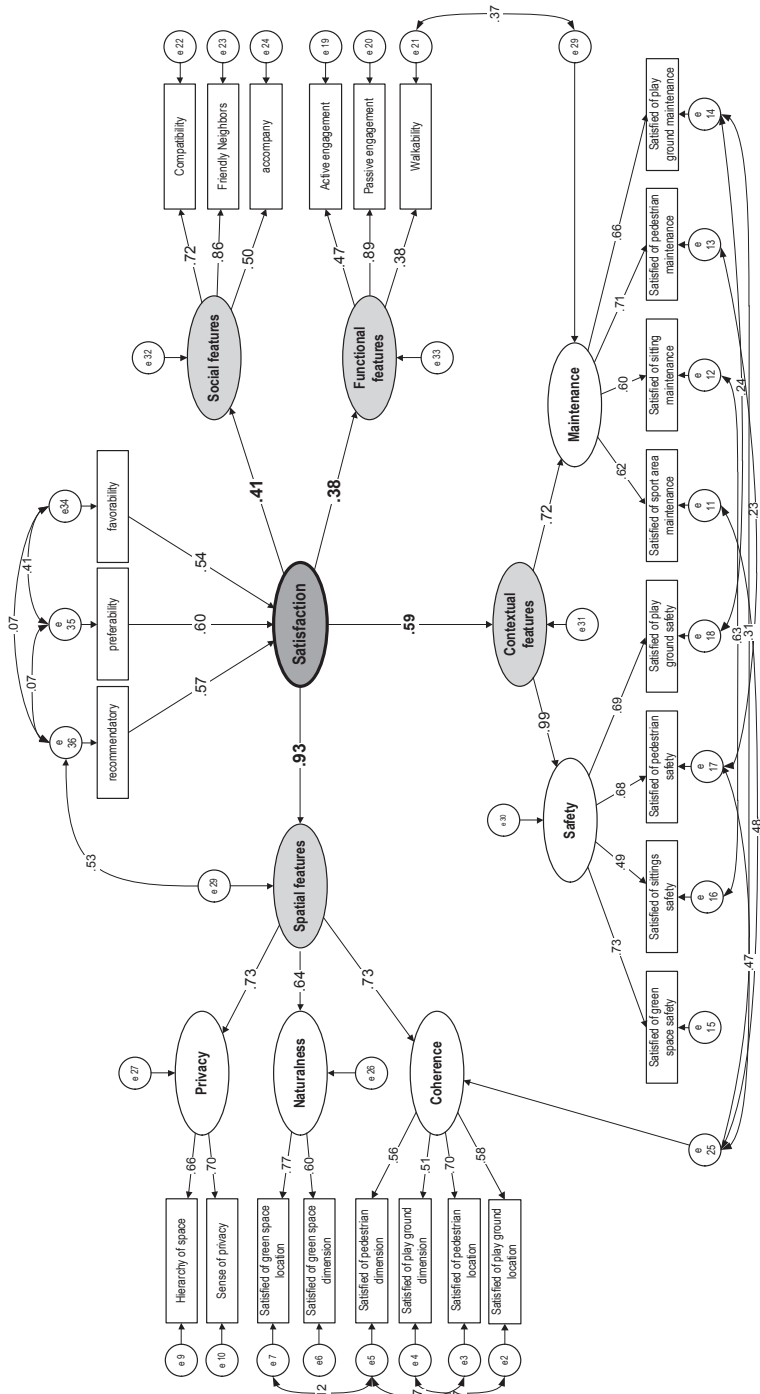


Fig. 6: Complete model of residential satisfaction
 All path coefficients were significant ($p < .05$)

sential to satisfy people from place. Sense of privacy and hierarchy of space are factors behind privacy while location and dimension of green spaces are factors behind Naturalness. The location of green space is more associated with satisfaction of natural space. Dimension and location of pedestrians and playground related to satisfaction of coherence, while pedestrian location and accessibility are more associated with satisfaction of coherence.

Latent variable of contextual features is the second considerable criterion influencing overall satisfaction (L.F. = 0.59) comprising safety (L.F. = 0.99) and maintenance (L.F. = 0.72), which are considered in different part of open space.

The social features were measured through three main questions: compatibility with neighbors, (L.F. = 0.72), friendship between neighbors (L.F. = 0.86) and accompanying each other (L.F. = 0.50). Functional latent variable, were asked through passive and active engagement with the environment. Active engagement refers to more direct experience with a place and people within it (Carmona & Tiesdell 2003:166) such as walking, playing, chatting while passive engagement can lead to a sense of relaxation, but it differs in that it involved the need for an encounter with the setting (Carr, Francis, Rivlin, & Stone 1992:105), comprising relaxation and watching others.

According to the Figure 7, spatial feature is the most important aspect associated with residential satisfaction, followed by contextual features. Generally, it seems privacy; coherence and safety have the most significant effect on people evaluation of place.

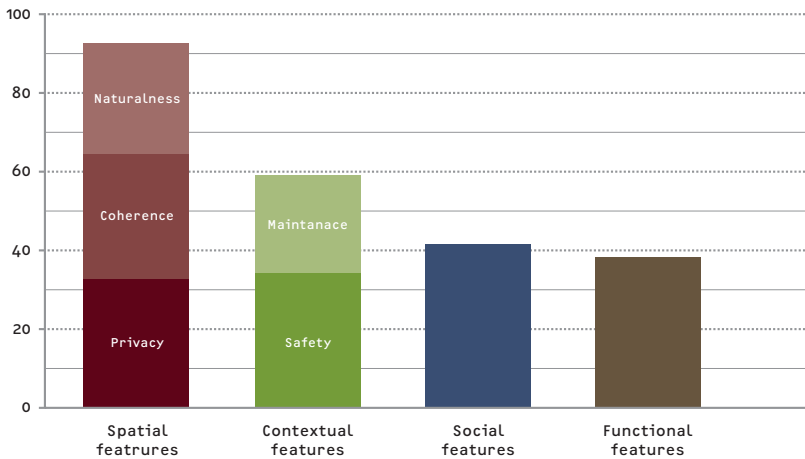


Fig. 7: Comparing different criteria associated with overall satisfaction.

3.1 Limitations

This study faced some limitations that should be noted. Firstly, it is based on cross-sectional observation. Where despite the frequently application in environmental researchers, the causal direction of the findings (i.e. that privacy influences the place satisfaction) was pre-assumed. Therefore, the direction of the causal effect cannot be proven by the study alone, even though several of its findings coincide with previous researches. Additional local and experimental studies may be necessary. Secondly, the certain findings may be inclined by some characteristics of the surveyed sites as well as the cultural and social and economic background (Zhang & Lin 2011). Further studies focusing on cross-social differences can clarify better the influence of culture on aesthetic quality and perception.

4 Conclusions

The objective of this research was setting up and developing a model associated with residential satisfaction, which integrates multiple approaches. The empirical study has been conducted in the residential open space in the northern part of Tehran chosen from different types of building according to the open-space layout. The evaluated structure consists of four major dimensions, including spatial, social, functional and contextual criteria as the most fundamental evaluating aspects by several studies.

The case of Tehran residential complexes showed that the most important features which influences satisfaction is the spatial features. Sense of privacy, cohesion and safety are the most important criteria effect on people's satisfaction. The most striking result was that there is little evidence of social feature associated with satisfaction.

This research confirms the importance of open space design on dwellers' satisfaction. Satisfaction of open space affords a generalized view into well-being of habitant. Although architects mostly consider inside of building as the main part of the design process, open space has considerable influence on residents' perception and satisfaction from their environment. A comprehensive environmental model of residential satisfaction needs to be established that comprising different scale of outside and inside of buildings.

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