Students’ residential preferences: a case study is dormitories of University of Mohaghegh Ardabili

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ABSTRACT
Researchers believe that the architecture of residential halls has a significant impact on various aspects of students’ lives, especially on the quality of their education. The purpose of this study was to extract and evaluate residential preferences affecting the architecture of dormitories for students in dormitories at University of Mohaghegh Ardabili in Iran. The seven extracted indicators formed the basis of the researcher-made questionnaire with 35 questions. Pre-tests were performed at University of Mohaghegh Ardabili and its Cronbach’s alpha was obtained with a coefficient of 0.930. The size of the study sample was 250 students from among students, which was confirmed by Kaiser-Meyer-Olkin (KMO) method. The analysis of the exploratory factors was examined by two software 8.8 Lisrel and 26 SPSS and by the factor model test of the second order and the binomial test (ratio). We concluded that students’ residential preferences in the case study include indicators of dimensions, service and welfare, location, privacy, landscape, flexibility, and materials with a positive and direct impact. Statistical analysis showed that flexibility is the most important indicator and landscape is the least important indicator for students.

1. Introduction
Student dormitories in universities are of paramount importance after education. Dormitories replace the students’ home at certain times and are a reflection of the home environment for them. These residences must meet the needs of students and their parents and respond to the demands of their social lives (Hill 2007). The lives of university students in the residential environment, both inside and outside the university, have been of interest to many researchers for decades (Lundgren and Schwab 1979; High and Sundstrom 1977; Case 1981; Popelka 1994; Rinn 2004). Student accommodation has long been one of the basic facilities provided by higher education institutions to help students expand their intellectual abilities (Najib and Abidin 2011). For many students, entering college is the beginning of a new phase in life which includes the experience of living in dormitory. Research has shown that the living environment and the changes that take place in it affect people’s emotional state (Amole 2012). When students leave home to attend university, most of them have to keep their expenses to a minimum, and dormitories are very helpful in achieving this goal (Khozaei, Ramayah, and Hassan 2012). Also, due to the feeling of more security and the supervision of the dormitory officials, the students’ accommodation in the dormitory is more acceptable for their parents. Therefore, many students prefer to live in university dormitories. However, the issue of costs and economic savings has led to a minimalist view of the design of dormitories, which is why most dormitories do not qualitatively meet the housing and educational needs of students. Because of their importance, researchers have studied the effects of dormitories on students (Cross, Zimmerman, and O’Grady 2009; LaNasa, Olson, and Alleman 2007). A university dormitory is a special type of building that is expected to be both a haven for students and a comfortable and functional environment for learning and academic success (Hassanain 2007). In other words, dormitories have limited space to meet the needs of students, such as sleeping, eating, studying, and social activities. So, students need to adapt to this new situation that is different from their homes (Khozaei, Hassan, and Abd Razak 2011). Today, university dormitories, often referred to as dormitories, are less likely to meet the needs of students. An overview reveals that the architecture of dormitory buildings in most universities is designed and implemented more to meet the basic needs of students and with less attention to the qualitative dimensions and aspects related to their mental conditions. When resources are limited and a minimalist approach is applied, customer preferences from among the available options help the designer prioritize design options. Because financial resources are limited for the design and architecture of student dormitories, designers and planners have to choose cost-effective options in areas, interior

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divisions, forms, building materials, furniture, and more. In the meantime, if architects are aware of students’ residential preferences, there will be more coordination between the preferences of designers and planners and the preferences of residents and dormitory users. This study seeks to fill part of this study gap.

Researchers support the idea that the dormitory environment has a profound effect on students (Cross, Zimmerman, and O’Grady 2009; Blimling 1989). Even some studies have shown that residential halls may affect students’ progress, behaviour, and academic performance (Foubert, Tepper, and Morrison 1998; de Araujo and Murray 2010). In fact, the significant impact of residential halls may explain the myriad studies of students’ lives, inside or outside the university, over the past decades (Cross, Zimmerman, and O’Grady 2009; Najib and Abidin 2011; Ge and Hokao 2006; Thomsen 2008, 2007; Paine 2007; Amole 2005). If students’ preferences and differences and similarities between people are ignored by the designer, dissatisfaction will arise and serious emotional and psychological complications will occur. Also, the academic level of students can be adversely affected by the dormitory environment. The results of Masoudi and Mohammadi’s research showed a significant difference between dormitory and non-dormitory students in terms of academic grade (Masoudi and Mohammadi 2007). Therefore, it is necessary to pay attention to the students’ housing preferences and to investigate them in order to better understand their real demands and requirements (Khozaei, Hassan, and Abd Razak 2011). If architects and planners are aware of students’ residential preferences, they will be able to use architectural design methods to enhance the quality of living in student dormitories. Ignoring these priorities and differences can leave irreparable damage to the quality of education. Thus, accommodation can affect students’ growth, behavior, and even academic performance (Foubert, Tepper, and Morrison 1998; de Araujo and Murray 2010). Students who have difficulty adjusting to university conditions unfortunately deal with various complications viz. academic failure and low progress, dropout, anxiety, depression, isolation and drug abuse (Jiboye 2010).

The research hypothesis is that residential preferences affecting the architectural design of dormitories can be collected and prioritized from the perspective of students. In addition, simulating a dormitory with a student’s previous home is the researcher’s primary assumption of student preferences. The purpose of this study is to extract residential preferences that affect the architectural design of dormitories and measure their importance in terms of students living in the case study. This research is of descriptive-analytical type and statistical population of students living in dormitories of Ardabil State University in Iran. The number of dormitory residents is 1536 and the statistical sample are 250 students were selected from among students living in the dormitory, which will be selected by multi-stage cluster random sampling. The sample size will be evaluated and confirmed using the Kaiser-Meyer-Olkin (KMO) method.

2. Theoretical foundations

Residential preferences: Some researches consider the impact of demographic background on respondents to be the touchstone of their preferences. On a large scale, residential preferences include time, place, money, and social relationships (Heaton et al. 1979) Size of living space (Wang and Li 2006; Sirgy, Grzeskowiak, and Su 2005; Hempel and Tucker 1979; Hwang and Albrecht 1987), functional compatibility (Lindberg, Gärling, and Montgomery 1989), and neighborhood characteristics (Devlin 1994; Jim and Chen 2007). Housing preferences factors for accommodation include the quality of the outdoor environment (Thamaraiselvi and Rajalakshmi 2008), location (Wu 2010; Karsten 2007; Devlin 1994), neighborhood characteristics (Sirgy, Grzeskowiak, and Su 2005), surrounding landscape (Beals 2000), feeling of security and proximity to the city, public transport, closeness to the workplace, safety, medical and educational facilities (Ghani, Suleiman, and Malaysia 2016). Thomsen (2007) in her qualitative study entitled “Home Experiences in Student Housing: About Institutional Personality and Temporary Houses” showed that aspects of student housing architecture and their resemblance to their homes affect their residential preferences. Thomsen’s study reveals that “the possibility of personalizing private rooms to create a sense of home” is highly desirable for students (Thomsen 2007).

Student Residence: Housing is the foundation of human-environmental interaction that can be the basis of a happy, productive and successful life (Yusuff 2011; Cagamas 2013; Masoudi and Mohammadi 2007). A student residence is a housing unit where students live during their student days (Khozaei et al. 2010). In other words, the student residence is the housing unit of the students who live there to study. Many young students leave home and their parents and live in dormitories where there is no longer any parental supervision and control. This is a new situation to experience a different lifestyle. This is a new situation for experiencing a different lifestyle in which the student must learn to be independent, to compromise with others, to develop citizenship and to use common space and facilities, and to go through this stage of transition to adulthood (Zaransky 2006; Jaa’far 2012; Ge and Hokao 2006; Rodger and Johnson 2005). Student housing also has a profound effect on students’ overall political and social lives, such as
leadership development, behavior, academic performance, citizenship, and a sense of solidarity. As a learning environment, student accommodation integrates social and psychological functions to meet students’ needs, aspirations, and expectations (Khozaei et al. 2010). Most students are about eighteen years old, and many have never left home or experienced a previous dormitory. Thus, staying away from family for a long time is a lasting experience for young students because it is an opportunity to learn the ethics of life and how to live independently, how to deal with other students who are not relatives and everyone has to share a bathroom and toilet and a common space with others (Ciarrochi and Scott 2006). In addition, the type and layout of living in the dormitory, which can be called a shared bedroom, allows students to live and work together in a university community, in addition to their academic activities, and to fully embrace the academic ethics that lead to promoting citizenship and leadership (Ademiluyi and Raji 2008).

3. Literature review

However, much research on student housing covers a wide area (Hassanain 2008; Cross, Zimmerman, and O’Grady 2009; de Araujo and Murray 2010), But there is a paucity of research on students’ housing preferences and their real needs and requirements especially in the samples available in Iran and in comparison, with different cultures and societies (Khozaei, Hassan, and Abd Razak 2011). The lack of scientific works in this field may be due to the lack of theoretical foundations, relevant research tools, as well as unknown basic factors. The following are some examples of research conducted related to students’ residential preferences and their findings are shown in Table 1:

4. Methodology and case study

The initial assumption of the research was based on the similarity between the dormitory and the house, so that the residents of the dormitories prioritize factors in their preferences that give them a sense of home. In other words, students prefer to live in residential halls instead of places that have established characteristics. In order to conduct research, we extract from the articles, books and dissertations as well as face-to-face interviews with the students living in the dormitory the main indicators in conceptualizing the feeling of being at home in the dormitory. Hence, student housing preferences are primarily associated with these aspects. Afterwards, the literature correlated with the analyses and the results of the interview are examined in a case study to form the ultimate indicators from the perspective of the statistical society and a set of items under each index. For this purpose, the authors referred to the dormitories of Mohaghegh Ardabili University considering that one of the authors was the director of the dormitory department of Mohaghegh Ardabili University for 4 years and the other stayed in the dormitories of the university for 2 years. The authors “interviews with present residents based on these experiences helped refine the principal indicators and extract the final list, including seven indicators for students” residential preferences. These indicators were the main basis of the researcher-made questionnaire, which was divided into 35 questions in two sections. In the first part, students’ preferences were selected between the two options,1 and in the second part, the importance of each question was scored from 0 to 100. The next step is to verify the content validity of the questionnaire. Once the initial researcher-made questionnaire was prepared and the items were classified under each structure, it was sent to some experts who were involved in analogous researches at Mohaghegh Ardabili University and some other universities. Moreover, for pre-test, 30 undergraduate and graduate students living in Mohaghegh Ardabili University dormitories were asked to peruse and evaluate the questionnaire. That’s about 10 percent of the population. A statistician at Mohaghegh Ardabili University was also asked to evaluate the questions. The questionnaire also includes eight background questions about age, number of people in the room, length of stay, income, job, marital status, field of study and level of education of students. Exploratory factor analysis is performed with 8.8 Lisrel and 26 SPSS software. The process of the research is shown in Figure 1.

The dormitories inside Mohaghegh Ardabili University campus were selected as a case study. The required sample size was obtained by (KMO) method. The questionnaire was distributed among 250 students living in the dormitory. The residence of one of the authors in these dormitories and therefore easy access to them, as well as the sense of cooperation between students and most importantly the physical similarity of the dormitory complex with the general characteristics of dormitory construction in most Iranian universities, are the reasons for choosing this dormitory. In Figure 2, the study area has been determined.

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1In designing the questionnaire and asking questions, we faced some problems. In asking some questions and expressing the situations, it was already obvious that the respondents would opt for the one that has better facilities and conditions. In this case, the nature of the question was challenged and it seemed altogether nonsensical. For such questions, we tried to present each question in a specific financial range in addition to providing a possibility and advantage in each situation so that the audience could choose one by juxtaposing the advantages and disadvantages of each option. These options are such that it is not possible to distinguish between the two options and choose one over the other for the architect design as a suggestion for others.
Figure 1. The process of the research.

Figure 2. Study area.
Table 1. Research background of residential preferences of students living in dormitories.

| Authors | Year | Title | Results |
|---------|------|-------|---------|
| Khodaverdi khan, Agha yazdanfar, Ekhlasi | 2018 | Important Elements of Private Dormitory Spaces | Culture and subcultures, introversion and extraversion in the community has a decisive role. The hierarchy in the functional components of the physical input in the form of physical structures, the general performance and this important debate to ensure confidentiality major role is the same. Distinguishing between the public domain and the private domain, the intermediate spaces between public and private domains, the need for privacy in different spaces with different quality and quantity, enclosed courtyard, Controlled streets, respect for space access hierarchy, culture is the main determinant of introversion and extraversion in compliance with the degree of physical pop-up, arrangement of spaces, etc., in the development and promotion of the anatomic structures of privacy in dorm. |
| Oppewal, Poria, Ravenscroft & Speller | 2017 | Student preferences for university accommodation: an application of the stated preference approach | Results show that the students are most sensitive to whether they need to share shower and toilet facilities with other students and how far their accommodation is from campus. Room size is the next most influential attribute, followed by the mix of gender and mix of undergraduate versus postgraduate degree level students on the floor of residence. The view from the room has a smaller. Weekly rent had a surprisingly small effect in this study. This may indicate a willingness among students to pay substantial amounts for improvements to their rooms. Regarding student differences, it was found that, compared to postgraduates, undergraduate students show a strong preference for mixed gender floors and renovated instead of new buildings. |
| Muizz O Sanni- Anibire & Mohammad A Hassanain | 2016 | Quality assessment of student housing facilities through post-occupancy evaluation | It is established that student housing facilities have a direct link to the efficiency, productivity, health and well-being of students who use them. This study acknowledges the fact that continuous quality improvement is a fundamental objective of POE. Thus, in this study, it was noticed that despite the general satisfaction of occupants with some of the building performance indicators, the walkthrough observations and focus group meetings highlighted the reasons why other occupants may have expressed dissatisfaction. The list of recommendations serves as feedback and feed forward to improve the design and management of student housing facilities. |
| Heidari & Abdipour | 2015 | Evaluating the Role of Privacy in Promoting Attachment to Place in Student Dormitories | The result shows that level of place attachment is affected by the quality of achieving optimum privacy in student dormitory environments. At the same time, research suggests that person environment congruence, or the fit between the environment and the person, could be important in determining privacy needs. It means that when environment provide the appropriate conditions to bring the optimal privacy for the individual, he or she attaches to that environment. So, students are successful in regulating their privacy. |
| Nijensteijn; Haans; Kemperman & Borgers | 2015 | Beyond demographics: human value orientation as a predictor of heterogeneity in student housing preferences | The extent in which human values, in addition to demographics, can explain the choice heterogeneity was investigated. Based on the results of the mixed logit model, it can be concluded that, generally, students consider price the most important housing attribute in housing choice decisions, followed by cycling time to the campus, room size, and kitchen sharing. These findings seem consistent with the expectations of the local student housing provider (interview with Weinberg). In contrast to Thomsen and Eikemo (2010), having private or shared facilities was important for students in Tilburg and Breda. |
| Nadinmi, Faghahi Habib Abadi & Nazarpour | 2013 | The Influence of Landscape and Dormitory Design on Students’ Satisfaction (Case Study: Sabzevari University Student Girls’ Dormitories) | The results indicate that most students prefer to see natural environments, unwatched visions and perspectives, natural horizons, sunrises and sunsets, and green spaces around the residences. Therefore, it is suggested that natural landscape architecture should be an important principle in the design of student residential areas. |

(Continued)
Table 1. (Continued).

| Authors                                      | Year | Title                                                                 | Results                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------|------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Heydari, Motalebi & Nekooeimehr              | 2013 | Investigating the Relationship between Two Concepts of Place Sense and Attachment to Place in Students Dormitory | Findings show that there is a significant relationship between the sense of place and place attachment. If the sense of place is considered as the initial feeling when an individual face with a place, place attachment is the positive emotional feeling toward the place. The results also showed that physical factors of the environment are important in creating both sense of place and place attachment. The time factor has the lowest degree of significance in creating sense of place. However, in creation of place attachment, the time factor is the second most important factor after physical factor. |
| Oladiran                                     | 2013 | A Post Occupancy Evaluation of Students’ Hostels Accommodation        | The study reveals that the content of hostels accommodation in the University of Lagos includes bathrooms, common rooms, bedrooms, reading rooms, kitchen and fixtures. There is also a sparse availability of laundry, pantry and meeting room in some of the hostels. The level of satisfaction of the users with the hostel’s accommodation is “good” in term of noiselessness, indoor temperature, natural lighting, ventilation and water supply; while it is “fair” with electrical fittings, space, cleanliness and comfortability. |
| Kiliçaslan                                   | 2013 | Design of Living Spaces in Dormitories                                | The results from the study suggest that the primary purpose be to provide students with a healthy dorm environment where they can study, rest, have a good time, socialize. The students need shared spaces where they together can spend time and activity spaces where they watch TV, play table tennis, take exercise. Thus, in terms of conducting dormitory life positively, comfortable and well-thought-through designs should be created. The dormitory rooms are supposed to provide students with required physical conditions and spaces for spare time activities. |
| Khozaei, Ramayeh, Sanusi Hassan              | 2012 | A shorter version of student accommodation preferences index [SAPI] | The present study aimed to provide a shorter and more reliable version of the tool for examining student accommodation preferences, thus extending the previous work by collecting data from a subsequent sample. Confirmatory factor analysis and its subsequent iterative process yielded a SAPI with only 29 cases. The reality is that students’ needs and requirements are not exactly the same, and students from different backgrounds might have different needs and requirements. However, it is also true that a typical residence hall rarely satisfies all types of students. |
| UlyaniMohd Najib, Aini Yusof, NazirahZainulAbidin | 2011 | Student residential satisfaction in research universities              | In this study, SRS index is conceptualized as the overall satisfaction measure and loyalty behavior of SHF. It contributes to the literature by improving RSAT index by Amole (2009) to cover all types of SHF. In the study, the results show that in general, students are satisfied with the provided SHF, as demonstrated by the SRS index of 2.96 or 74 per cent satisfaction level. This purpose of this study was to develop and examine the reliability and validity of the SAPI. This instrument was developed to be used as a tool for the study of university students’ preferences toward their on-campus residence halls. The conceptual framework of this instrument lies in the similarity of residence hall and homes. It was conceptualized that the SAPI can be defined according to eight main preferences factors, namely visual, facility, amenity, location, personalization and flexibility at room, social contact, security and privacy. |
| Khozaei, Sanusi Hassan, Abd Razak            | 2011 | Development and validation of the student accommodation preferences instrument [SAPI] | This purpose of this study was to develop and examine the reliability and validity of the SAPI. This instrument was developed to be used as a tool for the study of university students’ preferences toward their on-campus residence halls. The conceptual framework of this instrument lies in the similarity of residence hall and homes. It was conceptualized that the SAPI can be defined according to eight main preferences factors, namely visual, facility, amenity, location, personalization and flexibility at room, social contact, security and privacy. |
| Yıldırım & Oğuzhan                           | 2010 | The effects of space quality of dormitory rooms on functional and perceptual performance of users: Zübeyde Hanım Sorority, | a meaningful relationship between settlement arrangements and density of equipment elements and residents’ satisfaction are identified. Accordingly, settlement arrangements and furniture density of the rooms have an influence on satisfaction. It is seen that a significant part of the residents are not satisfied because they find double-decker, cabinet, desk and chair in their rooms insufficient. Sufficient number of desks and chairs must be placed and the number of residents in the rooms must be considered for the residents to study more comfortably. Some students use mobile bookshelves and shoe cabinets in addition to the available equipment elements in the rooms that the available equipment elements in the rooms are insufficient. residents want to stay in the rooms in which less people stay than their own rooms. |
Table 1. (Continued).

| Authors          | Year | Title                                                                 | Results                                                                                           |
|------------------|------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Amole            | 2009 | Residential satisfaction in students' housing                        | More than half of the respondents were dissatisfied with their residences and the variables which explained satisfaction were the social qualities of the residences, especially, the social densities; the kitchenette, bathroom and storage facilities and some demographic characteristics of the students. The morphological configuration of the halls of residence was also found to be a predictor of satisfaction and the characteristics which appeared most significant were the plan form and the length of the corridor. The study showed that the students' housing provided performed well below average from the users' evaluations; implying that the residences did not match the aspirations and expectations of the students. This study has shown that the results of satisfaction studies in other housing contexts cannot simply be generalized to students' housing. |
| Hassanain        | 2008 | On the performance evaluation of sustainable student housing facilities | The study has determined the degree of satisfaction obtained for the identified 22 elements of technical performance and 26 elements of functional performance. It has found that the student residents were satisfied with the ten identified performance requirement categories. The overall mean response for the investigated four indoor environmental qualities was 2.80, matching a satisfaction rating of "Satisfied". Although the results of the POE presented in this paper is limited to sample building investigated, the structure of the user satisfaction survey could be generic in the sense that it could be applied to any student housing facility at any university campus with the proper customization. |
| Amole            | 2005 | Coping strategies for living in student residential facilities in Nigeria | In the context of this study, the most affected activity was that of studying, and the most used strategy was to withdraw from the room to study elsewhere. With drawing to study was only possible because of the perceived alternatives, and the success of this strategy would depend on the quality of the alternative places available. It is therefore important that those concerned with housing students recognize that as the systems of activities and settings within the residence's break down, other systems must be established. It must be noted that the most important student activity is that of studying. Hence, in designing and man-aging student residential facilities, specific attention needs to be given to studying not as an activity in and of itself but in relation to the length of stay of the student. |
| Rodger & Johnson | 2005 | The Impact of Residence Design on Freshman Outcomes: Dormitories Versus Suite-Style Residences | The results of this study give us good reason to believe that for this group of relatively quiet students with low activity levels, providing opportunities to get to know others with similar interests and motivation would result in improved outcomes. Activities that focus on creating a symbiotic living and learning environment where learning and academic pursuits are part of life outside the regular classroom could create a community of learners who, according to the results of this study, may be feeling left out. |

5. Findings

Since the housing preference factor was a hidden variable and was directly measurable, from the confirmatory factor analysis of the second time and with Lisrel software the version 8.80, we analyzed the data. We first examined whether the factor analysis model was appropriate for this study. The adequacy of the sample size was confirmed based on the (KMO) index, and the appropriateness of factor analysis was assessed using the Bartlett test. SPSS software outputs have been reported to be appropriate for the use of factor analysis model in Table 2. According to these results, because the value of the KMO index is 0.853 and close to 1, therefore, the amount of sample size is optimal for performing factor analysis model.

Also, according to the results reported in Table 3, since the Cronbach's alpha values for the two factors “location” and “vision” are 0.681, and 0.659 respectively, hence they are larger than 0.65, the reliability of the structure of this factor is satisfactory. This coefficient is greater than 0.7 for the rest of the factors, which indicates that the reliability of the structures of these factors is good enough and means that the questions related to the factors had a decent fit. Note that the first question of the location factor, which is related to the type of warehouse, was trimmed due to the increased reliability of the structure. In total, Cronbach's alpha coefficient for the whole questionnaire is 0.930 (approximately). Therefore, the reliability of the structures of the whole questionnaire is also sensational.
In the following, the data of this research are analyzed in Lisrel software and the second factor analysis is used for it. The results obtained for the studied model, which include all the hypotheses of this study, are presented in Figures 3 and 4. Figure 3 shows the amount of factor loads (impact values) of each factor and Figure 4 is related to their T-statistics. If the T statistical values between the two factors or variables are less than 1.96, it indicates that there is no relation between those two factors or variables.

The output of the factor values and the T statistic is summarized in Table 4.

According to Table 4, among the sub-variables of the dimension factors, table dimensions are in the first priority of students. Therefore, it has had the greatest effect on students’ residential preferences in this factor. In the service and welfare factor, the type of building and its newness are more important for students and have the greatest impact on their residential preferences. In location factor, the location of sports spaces is the first priority of students and has the greatest impact on their residential preferences in this factor. In the privacy factor, the first priority is to have access to the dormitory building and it has the greatest impact on the students’ residential preferences in this factor. In the vision factor, the room lighting variable is more important and the first priority of students in this factor. In the flexibility factor, the flexibility of the library space is the first priority and has the greatest impact on students’ residential preferences. In terms of materials, room color is the first priority and has the greatest impact on students’ residential preferences. In accordance with the results of the 8.08 Lisrel software for the second-order factor analysis model, because all T-statistics for all factors in the overall factor of residential preferences have values greater than 1.96, all of the above factors, in addition to affecting the residential preferences of dormitory students, are also significantly affected by a more general factor called residential preferences. In other words, the effect of factors on residential preferences is twofold. That is, the preferences preferred by students regarding the main factors such as dimensions, location, privacy, etc. affect the residential preferences, the factor of residential preferences also affects the prioritization of students in the tested dimensions and increase or decrease the amount of all factors including dimensions, services and it affects well-being, location, privacy, visibility, flexibility and materials. This, as noted earlier, is due to the fact that the residential preference factor is a latent variable and can be measured directly. To clarify the issue, the factor of residential preferences in terms of concept is equivalent to the priorities that students give to research variables. In other words, we consider the set of 7 factors with their sub-variables to be the same set of student residential preferences that are broken down into smaller components that can be considered in architectural design.

According to Table 5, all 7 main factors in the set of residential preferences of students have a positive and significant effect. That is, if we consider the set of 7 factors with their subset variables as the set of students’ residential preferences, all factors play a positive and significant role in this set. Thus, all factors are effective in prioritizing and selecting and preferring students. However, the most important factor influencing this set is the flexibility factor, the operating load of which is 0.95 and then the dimensions and services and welfare are in the next ranks in terms of importance, respectively. The least important factor is the view and landscape on students’ residential preferences. In the following, we examine the preferences of dormitory students using a two-sentence test (ratio test). The authors are well aware that respondents are normally inclined to prefer more facilities, and it is predictable that they may choose statements with favorable residential conditions. So, the authors tried to avoid such questions as much as possible. Respondents had to choose from options that had both advantages and disadvantages so that it is not easy to distinguish between the two options and prefer one over the other. Comparing the options presented in Table 6 for each question clarifies the issue.

Zero test assumption: Up to 50% of students prefer the first option in each question.

Assumption 1 of the test: more than 50% of students prefer the first option in each question.

The results of the two-sentence test for each question from the SPSS software are summarized in Table 6.

Given the level of significance of the answers in Table 6, we conclude that in most cases the tendency of students to one of the options is greater. It is noteworthy that in some variables, such as the way students are placed in buildings and the color of the furniture, they do not prefer any of the options over the other.

6. Discussion

In accordance with the purpose of the research, seven principal physical indicators affecting students’ residential preferences were educed based on existing principles and resources. According to the analysis of the data collected from Mohaghegh Ardabili University, the seven main indices are effective in residential preferences and the effectiveness of each factor has been obtained. In the following, by comparing similar researches, we compare and discuss their findings with our research findings.

Khozaei, Hassan, and Abd Razak (2011) conducted a study on residential preferences in student dormitories and achieved 8 main indicators. The conceptual
framework of this research lies in the similarity of the residence hall with the students’ own house. It was conceptualized that students’ residential preferences could be defined in terms of eight key factors: visual, installations, facilities, location, personalization, room lighting, social interaction, security, and privacy. The findings and physical indications of this study are consistent with our findings.

Oppewal et al. (2017) in their research achieved certain criteria in students’ residential preferences. The results of a sample of undergraduate and graduate students at a university in the United Kingdom showed that students are sensitive to the distance between shower and toilet facilities from the university and sharing these facilities with other students. The size of the room (four to nine square meters) is the most influential feature, after which a mixture of gender and a combination of students of different levels can be seen on the living floor. Landscapes are less important than rooms. Landscapes are less important than rooms, although the importance of landscapes is still significant. The results of this study are consistent with our research on the high importance of dimensions and sizes and the relatively low importance of landscape.

Research conducted by Muizz and Hassanain (2016) has shown that student housing facilities are directly related to the efficiency, health and well-being of the students who use them. The findings show that the most important issues include the operation and control of thermostats, the quality of building support services, the size of rooms, furniture and proximity to the cafeteria. The results of this study are consistent with our research, except for the control of thermostats, which was not relevant in our study due to the low energy cost in Iran.

Nijënstein et al. (2015) found interesting results by examining the issue beyond demographic factors, and using different criteria for residential preferences and considering the orientation of human values as a predictor in students’ housing preferences. This suggests that changes should be considered when designing a new student housing. In particular, housing features such as kitchen, bathroom and price are usually heterogeneous. This suggests that student housing should be different in these characteristics. Instead, the outdoor and walking space features show a slight heterogeneity, which suggests that these are not important to students. As a result, these housing features may be secondary to the development of new student housing projects. We found out that both social demographics and human value orientation could explain at least part of the heterogeneity of choices. The findings of this study are consistent with those of our research. Also, due to the free accommodation of public universities, price and cost are not relevant in our case study.

Khozaei, Ramayah, and Hassan (2012) in a re-examination on the subject of residential preferences and obtaining the relevant factors and summarizing their previous research were able to reduce the factors obtained in their previous research and re-examined other factors and concluded that A typical lounge rarely satisfies all kinds of students. Therefore, the characteristics of a living room that are adequate for students should be found in the students’ own responses. They reduced the number of factors to 6, namely, facilities (5 items), visual (7 items), room comfort (5 items), location (4 items), social contact (3 items) and security (4 items). All of these studies confirm the validity of the criteria obtained by the authors of this paper. These cases are consistent with the seven main indicators of our research.

7. Conclusion

Students’ accommodation preferences in the dormitory depend on a number of factors. Physical factors, among all the factors influencing the case study and 7 main indicators were obtained, according to the results of the research, all seven main indicators have a direct and positive effect on students’ residential preferences. Among them, the factor of flexibility with a factor loading of 0.95 and a statistic of T 7.30 were evaluated as the most important factor in students’ residential preferences. After flexibility, dimensional factor with factor loading of 0.92 and statistic of T 6.61, service factor and welfare with
Figure 3. Standard factor load diagram of the second-order factor analysis model.
Figure 4. T-values chart of the second-order factor analysis model.
Table 4. Factor load value, T-statistic related to the consequence index.

| Factor                      | Variable                  | Variable symbol | Factor load | T-Statistics | Priority |
|-----------------------------|---------------------------|-----------------|-------------|--------------|----------|
| Dimensions                  | Room dimensions           | D1              | 0.44        | –            | Fifth    |
|                            | Dimensions of WC and bathroom | D2           | 0.59        | 5.89         | Second   |
|                            | Dimensions of the bed     | D3              | 0.48        | 5.29         | Fourth   |
|                            | Dimensions of the closet  | D4              | 0.40        | 4.76         | Sixth    |
|                            | Table dimensions          | D5              | 0.70        | 6.34         | First    |
|                            | Window dimensions         | D6              | 0.54        | 5.64         | Third    |
| WC and Welfare              | banking services          | S1              | 0.49        | –            | Fifth    |
|                            | Publishers                | S2              | 0.66        | 6.47         | Second   |
|                            | Laundry service           | S3              | 0.48        | 5.62         | Sixth    |
|                            | transportation system     | S4              | 0.63        | 6.57         | Third    |
|                            | New building              | S5              | 0.67        | 6.78         | First    |
|                            | Internet access           | S6              | 0.54        | 6.06         | Fourth   |
| Location                   | Warehouse location        | L1              | 0.31        | –            | Fifth    |
|                            | Shops location            | L2              | 0.62        | 4.33         | Fourth   |
|                            | Location of sports space  | L3              | 0.78        | 4.51         | First    |
|                            | Kitchen location          | L4              | 0.75        | 4.49         | Second   |
|                            | Dormitory site plan       | L5              | 0.65        | 4.37         | Third    |
| Privacy                    | Single or collective mirror | P1            | 0.56        | –            | Fifth    |
|                            | Monitoring system         | P2              | 0.68        | 7.86         | Third    |
|                            | Deploy students of each field in a separate building | P3 | 0.41 | 5.42 | Sixth |
|                            | Establish students of different grades in different classes | P4 | 0.67 | 7.82 | Fourth |
|                            | Permission to access the dormitory building | P5 | 0.71 | 8.09 | First |
|                            | Permission to access the dorm rooms | P6 | 0.70 | 8.03 | Second |
|                            | Type of refrigerator     | P7              | 0.33        | 4.50         | Seventh  |
| Vision                     | Room view                 | V1              | 0.63        | –            | Second   |
|                            | Lighting                 | V2              | 0.79        | 7.26         | First    |
| Flexibility                | Flexibility of furniture  | F1              | 0.47        | –            | Fifth    |
|                            | Flexibility of indoor uses | F2            | 0.53        | 5.96         | Fourth   |
|                            | Flexibility of collective halls | F3 | 0.61 | 6.47 | Third |
|                            | Kitchen flexibility       | F4              | 0.71        | 6.96         | Second   |
|                            | Library flexibility       | F5              | 0.74        | 7.07         | First    |
| Materials                  | Floor coverings           | M1              | 0.31        | –            | Fourth   |
|                            | Facade of buildings       | M2              | 0.82        | 4.67         | Second   |
|                            | Room color                | M3              | 0.88        | 4.70         | First    |
|                            | Furniture color           | M4              | 0.66        | 4.51         | Third    |

Table 5. Route coefficients, T-statistic and Significance of general structural equation model.

| From factor                              | To factor               | Factor load | T-statistics | Result | Order of importance |
|------------------------------------------|-------------------------|-------------|--------------|--------|---------------------|
| Residential preferences                   | Dimensions              | 0.92        | 6.61         | significant positive effect | Second |
| WC and welfare                           | 0.86                    | 7.16        | significant positive effect | Third |
| Location                                 | 0.77                    | 4.41        | significant positive effect | Fifth |
| Privacy                                  | 0.86                    | 8.33        | significant positive effect | Third |
| Vision                                   | 0.71                    | 7.06        | significant positive effect | Seventh |
| Flexibility                              | 0.95                    | 7.30        | significant positive effect | First |
| Materials                                | 0.72                    | 4.45        | significant positive effect | Sixth |

Factor loading of 0.86 and statistical load of T 7.16, then privacy with factor loading of 0.86 and statistic of T 8.33 were more important than other factors, respectively. According to the students, the least important factor among the 7 main factors of this research is the perspective and landscape factor with a factor loading of 0.71 and a statistic of 7.06. In general, students prefer that the dormitory spaces be more flexible and that there is a multi-purpose use of the spaces as well as the possibility of a variety of activities in the limited dormitory spaces. Also, for students, the factor of dimensions after flexibility is more important than other factors. Considering that this research was conducted on current students living in dormitories, it can be said that the dimensions of the spaces were different from their desired dimensions and the students’ choice was another type of division and allocation of spaces to uses within the same general area.

In the following, the importance of each of the sub-variables of the main indicators is obtained. For example, among the sub-variables of the flexibility factor, the flexibility of the library space is the first priority and has the greatest impact on students’ residential preferences. These results, as well as the results of the final stage of the research on student preference among the two descriptive options with advantages and disadvantages, help the architect to present their suggestions with knowledge of students’ preferences and choices. Also, compared to other similar studies, most of the factors and findings of this study were consistent with others, but some factors such as air temperature regulation inside the dormitory and accommodation costs were not relevant due to cheap energy and free student accommodation in Iran.
Table 6. The values of the factor load of the T-statistics related to the consequence index.

| Factor               | Question                                                                 | Options                                                                 | Number of respondents | Observed ratio | Significant | Result                                                                 |
|----------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------|----------------|-------------|------------------------------------------------------------------------|
| Dimension            | Room dimension                                                          | Small room with few people                                            | 231                    | 0.92           | 0.000       | Students prefer a small room with few people                            |
|                      |                                                                          | Large room with lots of people                                        | 19                     | 0.08           |             |                                                                        |
|                      | Dimensions of WC and bathroom                                          | Service and bathroom in the room                                       | 142                    | 0.57           | 0.037       | Students prefer the WC and bathroom in the room                         |
|                      |                                                                          | Accumulation of WC in a specific location                             | 108                    | 0.43           |             |                                                                        |
| Dimensions of the bed| Large two-story bed                                                     |                                                                        | 173                    | 0.69           | 0.000       | Flat students prefer large, two-story dimensions.                       |
|                      | Small single bed                                                        |                                                                        | 77                     | 0.31           |             |                                                                        |
|                      | The closet dimensions                                                   | Small locker room for each person, separate                            | 194                    | 0.78           | 0.000       | Students prefer the small locked appliances closet for each person.    |
|                      |                                                                          | Large locker without lock for all members of the room                 | 56                     | 0.22           |             |                                                                        |
|                      | Table dimensions                                                        | There are several small but personal tables                            | 146                    | 0.58           | 0.009       | Students prefer several personal but small tables to a large, collective table. |
|                      |                                                                          | A large but collective table                                           | 104                    | 0.42           |             |                                                                        |
|                      | Window dimensions                                                       | Large room window, lighter and landscape with more cold penetration    | 167                    | 0.67           | 0.000       | Students prefer a larger room window with more light and scenery but with more cold penetration. |
|                      |                                                                          | Smaller room windows, less light and scenery but less cold penetration | 83                     | 0.33           |             |                                                                        |
| WC and Welfare       | Banking services                                                        | The presence of an ATM in each building                                | 149                    | 0.60           | 0.003       | Students prefer an ATM in each building.                                |
|                      |                                                                          | Presence of an electronic bank branch for all buildings                | 101                    | 0.40           |             |                                                                        |
|                      | Publishers                                                               | Small publications in a short period of time in each building         | 80                     | 0.32           | 0.000       | Central publishing students prefer 24 hours for all buildings to small publications within each building with limited working hours. |
|                      |                                                                          | Central Publications 24 hours for all buildings                       | 170                    | 0.68           |             |                                                                        |
|                      | Laundry service                                                         | A laundry with a small number of appliances in each building          | 146                    | 0.58           | 0.009       | Students prefer to have a laundry with a small number of machines in each building. |
|                      |                                                                          | Accumulation of laundries with more devices in one place for all buildings | 104                  | 0.42           |             |                                                                        |
|                      | Transportation system                                                   | Taxis are available 24 hours a day at a higher cost                   | 66                     | 0.26           | 0.000       | Students prefer to have access to public transportation stations at a lower cost. |
|                      |                                                                          | Proximity to public transportation stations at a lower cost           | 184                    | 0.74           |             |                                                                        |
|                      | Building type                                                           | Building with more seat but newer                                     | 174                    | 0.70           | 0.000       | Students prefer to have a more compact type of building than an older, less dense building. |
|                      |                                                                          | Building with less density but old builder                            | 76                     | 0.30           |             |                                                                        |
|                      | Internet access                                                         | Internet with limited speed and volume for free                       | 150                    | 0.60           | 0.002       | Students with free limited speed and volume prefer high-speed but unlimited high-cost internet. |
|                      |                                                                          | Internet with unlimited speed and volume                              | 100                    | 0.40           |             |                                                                        |
|                      | Location                                                                | There is a small storage room inside each room                        | 189                    | 0.76           | 0.000       | Students prefer a small storage room inside each room.                  |
|                      |                                                                          | There is a large central warehouse for all the rooms                  | 61                     | 0.24           |             |                                                                        |
|                      | Shop location                                                           | Small buffet with limited facilities in each building                 | 86                     | 0.34           | 0.000       | Student prefer central and large markets with more facilities          |
|                      |                                                                          | Central and large market with more facilities for the whole collection | 164                    | 0.66           |             |                                                                        |
|                      | Location of sports space                                                | There is a small sports space with semi-professional devices in each building | 163                | 0.65           | 0.000       | Students prefer sports space with semi-professional devices in each building. |
|                      |                                                                          | Integrate the central sports space with professional devices for all buildings | 87                    | 0.35           |             |                                                                        |
|                      | Kitchen location                                                        | There is a small kitchen with few facilities on each floor            | 190                    | 0.76           | 0.000       | Students prefer small kitchens with less facilities on each floor.     |
|                      |                                                                          | Collect kitchens on one floor with more facilities                    | 60                     | 0.24           |             |                                                                        |
|                      | Location of the dormitory building                                       | Dormitory building in university campus and closet to university facilities | 223                | 0.89           | 0.000       | Students prefer that the dormitory building be inside the university and close to the university facilities. |
|                      |                                                                          | Dormitory building outside the university and close to urban facilities | 27                     | 0.11           |             |                                                                        |

(Continued)
| Factor                        | Question                                                                 | Options                                                                 | Number of respondents | Observed ratio | Significant | Result                                                                 |
|-------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------|----------------|-------------|-------------------------------------------------------------------------|
| Privacy                       | Mirror type                                                              | There are a few small personal mirrors                                  | 174                   | 0.70           | 0.000       | Students prefer to have a few small personal mirrors.                  |
|                               |                                                                           | There is a tall mirror for all the members of the room                   | 76                    | 0.30           |             |                                                                         |
|                               | Monitoring system                                                        | Existence of monitoring system for public parts                         | 173                   | 0.69           | 0.000       | Students prefer public spaces to have a monitoring system.             |
|                               |                                                                           | Lack of monitoring for public parts                                      | 77                    | 0.31           |             |                                                                         |
|                               | How to place students in buildings                                      | Students of each field in a particular building and floor                | 135                   | 0.54           | 0.229       | Students do not prefer any of the options.                              |
|                               |                                                                           | Divide students of different disciplines into classes                    | 115                   | 0.46           |             |                                                                         |
|                               | How to place students in classes                                         | Students of different grades in different buildings and floors           | 96                    | 0.38           | 0.000       | Students prefer to have students of different grades spread across different buildings and floors. |
|                               | Permission to access the dormitory building                              | Divide students into buildings and floors                                 | 154                   | 0.62           |             |                                                                         |
|                               |                                                                           | You do not need an ID card to enter the dormitory building              | 148                   | 0.59           |             |                                                                         |
|                               | Permission to access the dorm room                                       | An ID card is required to enter the room                                 | 173                   | 0.69           | 0.000       | Students prefer an ID card to enter the room.                          |
|                               |                                                                           | You do not need an ID card to enter the room                             | 77                    | 0.31           |             |                                                                         |
|                               | Type of refrigerator                                                     | Allocate a small refrigerator for each room                             | 235                   | 0.94           | 0.000       | Students prefer that each room have a small refrigerator rather than a large refrigerator for several rooms. |
|                               |                                                                           | Allocate a large and shared refrigerator between several rooms          | 15                    | 0.06           |             |                                                                         |
|                               | Vision                                                                   | Having a natural view from the window of the room                       | 218                   | 0.87           | 0.000       | Students prefer to have a natural view from the window of the room.    |
|                               |                                                                           | Having a view of residential and urban areas from the window of the room| 32                    | 0.13           |             |                                                                         |
|                               | Lighting                                                                  | Get natural light in the room during the day and artificial light at night| 231                   | 0.92           | 0.000       | Students prefer to receive natural light in the room during the day and artificial light at night. |
|                               |                                                                           | Get artificial light in 24 hours                                         | 19                    | 0.08           |             |                                                                         |
|                               | Flexibility                                                              | Adjustable furniture                                                    | 224                   | 0.90           | 0.000       | Students prefer removable furniture.                                   |
|                               | Flexibility of furniture                                                 | Non-removable furniture                                                  | 26                    | 0.10           |             |                                                                         |
|                               | Room flexibility                                                          | The room is just a bedroom                                              | 60                    | 0.24           | 0.000       | Students prefer to have different activities in their room.           |
|                               |                                                                           | Ability to perform activities such as studying and exiting in the room  | 190                   | 0.76           |             |                                                                         |
|                               | Flexibility of collective halls                                          | There are several small halls with different uses                       | 166                   | 0.66           | 0.000       | Students prefer several small halls with different uses.              |
|                               |                                                                           | There is a large multi-purpose hall for the whole building              | 84                    | 0.34           |             |                                                                         |
|                               | Kitchen flexibility                                                       | Separate the kitchen from the dining room and reduce the size           | 153                   | 0.61           | 0.000       | Students prefer to separate the kitchen from the dining room.          |
|                               |                                                                           | Kitchen integration of the dining hall in a large space                 | 97                    | 0.39           |             |                                                                         |
|                               | Library flexibility                                                       | Separate the library from the reading room                              | 165                   | 0.66           | 0.000       | Students prefer to separate the library from the reading room.         |
|                               |                                                                           | Integration of the library with the reading room                        | 85                    | 0.34           |             |                                                                         |
|                               | Material                                                                  | Floor coverings                                                         | 224                   | 0.90           | 0.000       | Students prefer the floor of the carpet room.                          |
|                               |                                                                           | The floor of the room should be carpeted                                 | 26                    | 0.10           |             |                                                                         |
|                               | Facade of buildings                                                       | Each block has a different color and look                               | 145                   | 0.58           | 0.013       | Students prefer each block with a different color and look.            |
|                               |                                                                           | All blocks have the same view                                           | 105                   | 0.42           |             |                                                                         |
|                               | Room color                                                                | The walls and ceiling are warm                                          | 147                   | 0.59           | 0.006       | Students prefer warm walls and ceilings.                               |
|                               |                                                                           | The walls and ceiling are cool                                          | 103                   | 0.41           |             |                                                                         |
|                               | Furniture color                                                           | Furniture should be light in color                                      | 125                   | 0.50           | 1.000       | Students do not prefer any of the options.                             |
|                               |                                                                           | Dark colored furniture                                                  | 125                   | 0.50           |             |                                                                         |
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