A RESEARCH ON THE EVALUATION OF THE LIVING ENVIRONMENT IN UNIVERSITY DORMITORY ANALYSIS ON THE ROOM USER'S SATISFACTION BASED ON THE EVALUATION RESULTS

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ABSTRACT

In recent years, it is required to reduce the carbon dioxide according to the Kyoto protocol declared in the year 2005. For that, it is important to design energy saving buildings. The energy consumption in the buildings is mainly based on the equipments fixed there, and there are many previous researches on that. However, the energy consumption can also be affected by the way of living and using the building. Therefore, it is also important to analyze the relationship between energy consumption and resident's lifestyle through the satisfaction of user. Matsubara et al. had researches based on the relationship between the usage of the air-conditioner and the inhabitant's life style in Kyoto and clarified the correlation between. However, this research targeted several kinds of respondent's attributions and the house types and resulted unclearly. For that reason, university dormitory is targeted for this research because the attribution of the respondent is mostly similar and it makes the effect of the respondent lifestyle on the evaluation more obvious. The purpose of this research is to clarify the relationship between the resident lifestyle and satisfaction in a dormitory and clarify the tendency of the student's evaluations on their living environment.

Keywords: Student dormitory, Evaluation on importance, Satisfaction, Warming behavior

1. INTRODUCTION

There are many researches based on the living evaluation targeted great number of people with many kinds of attribution and the living environment. Matsubara et al. had researches based on the relationship between the usage of the air-conditioner and the inhabitant's life style in Kyoto and clarified the correlation in between. It is important to analyze the inhabitant's satisfaction through the evaluation toward the living environment and there are many reasons for that. First of all, it is important to evaluate the living environment from the view point of the room users because the performance of the building is not only the function by also the satisfaction of the users.

Secondly, the evaluation of the living environment is seems to be affected by the attribution of the user and the life style of the user. In addition, it is also affected by the culture and the social background of that time. Therefore, to deeply analyze the satisfaction of the room user, it is important to have narrow target for the evaluation. The purpose of this research is to analyze the factors for the satisfaction in university dormitory through the questionnaire survey targeted university students living there. Furthermore, to grasp the tendencies of the satisfaction based on the student's attribution and living conditions.

2. RESEARCH OUTLINE

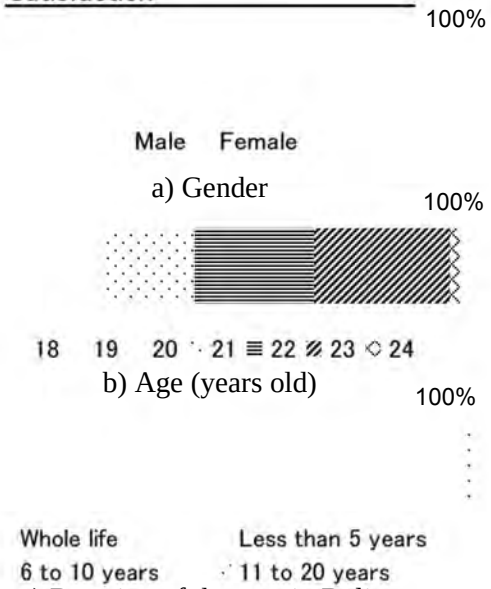
2.1 The targeted university dormitory

This questionnaire survey took place in Dalian, China in March 2009. 100 questionnaires were distributed and returned 100%. The targeted university locates in little bit far from the center of Dalian. The pictures of the dormitory are shown in Figure 1. There are only shared toilet and shower room and no private bathroom. Central heating system is fixed in each room and no private heating equipment is allowed to bring into the room to avoid fire. In addition, most of the university students are required to live in the student dormitory after the entrance unless there is any special reason to live outside.

Figure1: Pictures of the university dormitory

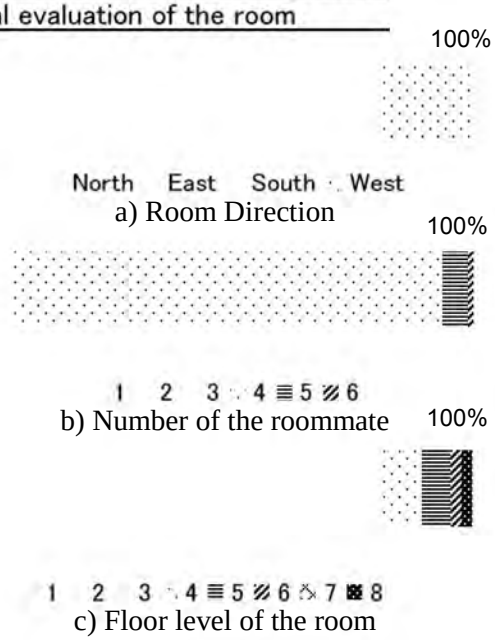
Table 1: About the questionnaire

Category	Content
Individual Attribution	Gender, Age, Duration of living, etc
Room Type	Room direction, Floor level, etc
Actual Evaluation (20 items)	Warmth, Size, New, Brightness, etc
Importance Evaluation (20 items)	Warmth, Size, New, Brightness, etc
Warming Behavior	About the behavior to warm oneself
Satisfaction	Total evaluation of the room



a) Gender
b) Age (years old)
c) Duration of the stay in Dalian

Figure 2: Attributions



a) Room Direction
b) Number of the roommate
c) Floor level of the room

Figure.3: Room type

2.2 The content of the questionnaire

The content of the distributed questionnaire for this research is shown in Table 1. The questionnaire is divided into 6 categories, such as the user's attribution, room type, actual evaluation of the room, the importance of the room on evaluation, warming behaviour by the room user, and total satisfaction of the room The questions posed for the actual evaluation and the importance evaluation are on the same topic to figure out the matters which need to be ameliorated.

3. RESEARCH RESULT

3.1 Room User's attribution

The attribution of the room user's is shown in Figure 2. The percentage of the male and female is almost equal. The age range is between 18 to 24 and the majority is 22 and 23 on this survey. Most of the room user's stay in Dalian less than 5 years and it means that they started to live in Dalian after they entered to university. On the other words, most of them are not local Dalian people.

3.2 Room type

The room type of the users is shown in Figure 3. Looking at the room direction, many of the rooms are facing weather North or South. In addition, the most of rooms are for 4 people out of the room type for 1

to 6 people. Most of the rooms are located on higher than 2nd floor but still some rooms are on the first floor as well.

3.3 Actual Evaluation and the Importance Evaluation

The average scores of the actual and importance evaluation are plotted as shown in Figure. 4. The evaluation items are also shown in Table 2. Looking at Figure.4, evaluation Item, No.1 marked the highest score on the importance and No. 19 marked the lowest. Focusing on No. 1, this is about the warmth of the room. However, actual evaluation of the room marked low score. It means the room is not warm enough in winter. Focusing on No.19, this is about the comfortability of the room to keep staying. The actual evaluation score is the lowest among the items. It means that university students do not mind to keep staying in the room for long time because they plan to live there only for few years. On actual evaluation, No. 16 marked the highest score and No. 15 marked the lowest. This means that the fixes heating system is not enough and need to have extra heating system in the room.

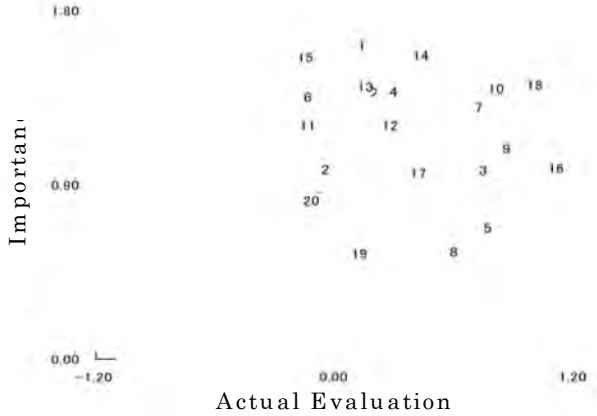


Figure 4: Result of the actual and importance evaluation

Table 2: Category Items

No	Item	Evaluation	No	Item
1	Warmth		11	Linen materials
2	Room Size		12	Fee for the room
3	Nouveaute		13	Silentness
4	Room color		14	Cleanliness
5	Room window size		15	Heating system
6	Sulight in the room		16	Extra heating system
7	Freshness of the air		17	Thickness of the wall
8	Humidity		18	Atmosphere
9	Function of the room		19	Comfortability
10	Lighting facility		20	View

4. ANALYSIS OF THE RESULTS

4.1 Factor loading matrix on the actual evaluation

To analyze the tendency of the actual evaluation, factor analysis was taken. The result of the factor loading matrix, setting the factor number as 3 is shown in Table 3. Focusing on the items marked high factor score, the first factor means “Room temperature” because the items such as “Warmth”, “Heating system”, and “Sunlight” relating to the room temperature are categorized into the first factor. The second factor is relating to “Atmosphere” because the items such as “Silentness” and “Cleanliness” are categorized. The third factor means “Room function” because the items such as “humidity of the room”, “Extra heating equipment”, and “Room window size” are categorized.

4.2 Factor loading matrix on the importance evaluation

To analyze the tendency of the importance evaluation, factor analysis was taken. The result of the factor loading matrix, setting the factor number as 3 is shown in Table.4 Focusing on the items marked high factor score, the first factor means "Room function" because the items such as, "Window size", "Wall thickness", and "humidity" relating to the room function are categorized into the first factor.

The second factor is relating to "Atmosphere" because the items such as "Silentness" and "Cleanliness" are categorized. The third factor means "Room temperature" because the items such as "Heating system", "Warmth", and "Extra heating system" are categorized

4.3 Average Factor Score in each gender

To analyze the tendency of the evaluation, average factor score in each gender was calculated and plotted as shown in Figure. 5 Figure.5 shows the average factor score of both male and female in each factor. In all the 3 factors, male and female show the big difference on the evaluation. By the result, it is possible to say that the way of the evaluation on the university dormitory between man and female is obviously different.

4.4 Average Factor Score in each age

To analyze the tendency of the evaluation, average factor score in each was calculated and plotted as shown in Figure 6.

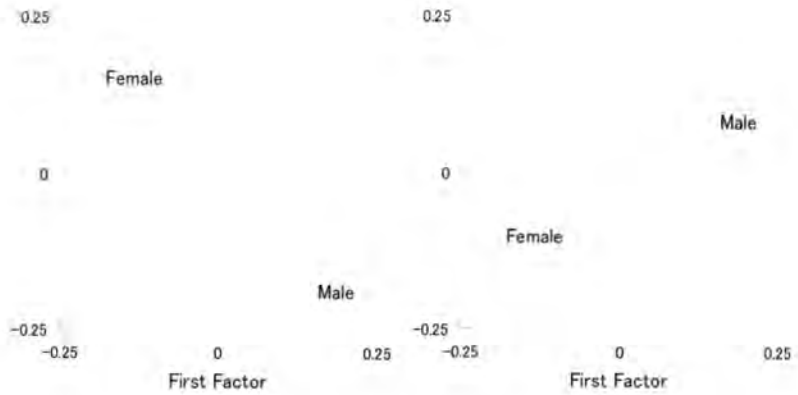


Figure 5: Average factor score in each gender

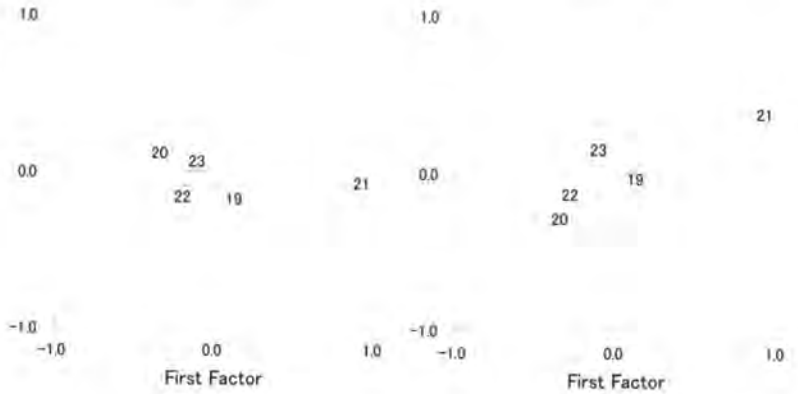


Figure 6: Average factor score in each age

Table 3: Factor Loading Matrix on Actual Evaluation

	1	2	3
A1	0.735	0.013	0.203
A15	0.683	0.135	−0.048
A11	0.547	0.140	0.103
A6	0.535	0.436	−0.217
A4	0.473	0.361	−0.235
A12	0.342	0.256	0.233
A20	0.322	0.243	−0.001
A7	0.296	0.116	0.230
A13	0.020	0.729	0.151
A14	0.271	0.706	0.120
A19	0.311	0.430	0.162
A18	0.168	0.302	0.225
A8	−0.226	−0.082	0.593
A16	−0.146	0.055	0.565
A5	0.308	0.206	0.461
A9	0.033	0.380	0.414
A2	0.401	0.042	0.405
A17	0.094	0.269	0.367
A10	0.222	0.134	0.366
A3	0.121	0.055	0.293

Table 4: Factor Loading Matrix on Importance Evaluation

	1	2	3
I5	0.723	0.148	0.028
I17	0.664	0.127	0.091
I8	0.524	−0.003	0.206
I2	0.496	0.254	0.140
I6	0.469	0.331	0.119
I4	0.468	0.391	0.030
I20	0.447	0.225	0.260
I19	0.279	0.150	0.142
I18	0.330	0.648	0.219
I13	0.084	0.589	0.223
I14	0.185	0.580	0.104
I7	0.420	0.578	0.201
I12	0.212	0.354	0.237
I9	0.367	0.083	0.690
I11	−0.068	0.446	0.552
I15	0.094	0.377	0.519
I10	0.427	0.138	0.512
I1	0.193	0.063	0.485
I16	0.011	0.143	0.433
I3	0.322	0.242	0.346

- Capital A next to the number emphasizes the items for the actual evaluation
- Capital I next to the number emphasizes the items for the importance evaluation

Looking at Figure 6, 21 year old student showed the clear difference on the evaluation of the room in all the factors. Many of the students in China enter to university by the age of 19 and 21 year old is after 2 or 3 years of university life. By this point of view, probably it is possible to say that at the beginning and at the end of the university life, students have similar way for the evaluation. However, in the middle of the university life, the students have different way for the evaluation.

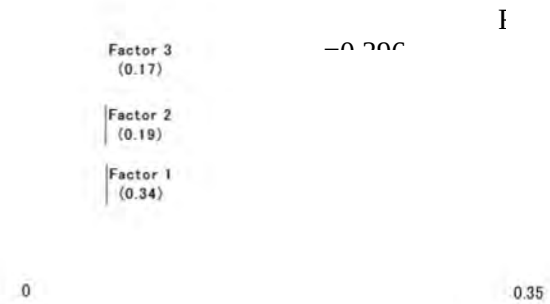


Figure 7: Result of multiple linear regression

5. ANALYSIS ON THE FACTORS WHICH AFFECT ROOM USER'S SATISFACTION

To grasp the factor which affects the room user's satisfaction, multiple linear regression analysis was taken. The result of the analysis is shown in Figure 7.

Multiple correlation coefficients were resulted as 0.396 and this is not very good score for this kind of analysis. One of the reasons is that the value for the satisfaction is category parameter. However, the value of the standard partial regression coefficient can show the coefficient between the 3 factors and the satisfaction value.

According to Figure 7, factor 1 showed the largest value of standard partial regression coefficient. Factor 1 emphasizes the "Room temperature" as it was shown in Table 3. For that reason, it is possible to say that for the university student, if the thermal condition of the dormitory is efficiently controlled, the satisfaction can go up and the effect of the thermal environment is bigger than the other factors.

6. CONCLUSION

This research targeted the university students living in university dormitory. As a result, the tendencies of the evaluation were grasped. The tendencies were as followings. First of all, the, by the importance evaluation, "warmth of the room" was highly evaluated. However, its actual evaluation was low. Secondly, the differences on the evaluation between each gender and age were grasped. By this analysis, there was especially a clear difference between male and female. Lastly, the factor which affects the user's satisfaction was clarified by multiple linear regression analysis. As a result, the factor which emphasizes "Room temperature" got the highest value of standard partial regression coefficient among the 3 factors derived from factor analysis.

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