



## **Determining Perceptual and Functional Quality in Dwelling Kitchens: Samples of Selcuk University TOKI Apartments**

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### **ABSTRACT**

Kitchens and bathrooms called as wet spaces in houses have great importance for house construction and interior arrangement of house. During the design process, it is highly important to do consciously the planning of wet spaces. The most important criterion to be considered for design is that wet spaces have proper characteristics for changing life conditions and technological requirements. This research determines at what stage the daily needs of the occupants accommodating in apartments built by Mass Housing Administration (TOKI) has been answered and the complaints if there exist. For that aim, kitchens having the same interior organization were used as the stimuli in recently built by TOKI in a district called Selcuk University Campus in Konya. According to the results obtained by means of a detailed questionnaire, occupants in Selcuk University thought the kitchens functionally insufficient related with difference of education level. Moreover, all occupants complain the insufficient use of storages of the dwelling with different ratio and the ratio shows increment based on people population living in the home. Another striking result was the users' perceptual evaluation on their kitchens as they mostly found the space uninteresting and ordinary.



**Keywords:** TOKİ, Apartment dwelling, Kitchen, Interior design, Perception.

## 1. INTRODUCTION

Kitchens and bathrooms called as wet spaces in houses have great importance for house construction and interior arrangement of house. During the design process, it is highly important to do consciously the planning of wet spaces. The most important criterion to be considered for design is that wet spaces have proper characteristics for changing life conditions and technological requirements.

Kitchen is a space where spare most of time in the house during the day. As the time have already become more important, the functionality of kitchen has also become more important. In housing surveys made, it was seen that living and service spaces forming active living sections of a house were used frequently and intensely and it was stated that these spaces took place near the top with regards to the importance level [1].

Among these researches; in a research made in houses appealing to three different socio-economic status (SES) in Turkey, Işık [2] stated that it is highly important that findings obtained by the examination of the life of families having different socio-economic status (SES) and their use of house are essential for using in newly-built houses and interior arrangements. Similarly, Yıldırım [1] argued in his study that the efficiency of work made in the kitchen can be increased positively in case that the anthropometric dimension of users are considered separately for every three SESs depending upon the importance, frequency of occurrence, storing principles and action requirements in the interrelationship of equipment elements, in sizing the working planes and storing areas and in determining the dimensional size of interior equipment elements and kitchen space by stating that low, medium and high SES house kitchens have different characteristics with regards to design criteria.

Baytin [3] tried to develop proper standards for the dimension, modes of living and other socio-economic and cultural characteristics of Turkish people by comparing the performance criteria and standards applied in Turkey and other countries with regard to the wet spaces of house. Neufert [4] determined the most proper dimension of kitchen, the depth of countertop, the size dining space by explaining the factors and elements to be considered in planning the kitchens. Sayel [5] reported that kitchen is not only a space where we meet our needs for dining, but also in touch with life and communes with other spaces. Phipps [6] stated that kitchen space has become a work centre where actions such as making food, cooking and dishing are done and so the application of modular system to equipment elements may be useful for flexibility and changeability.



In another study concerning interior equipment elements of kitchen, İmamoğlu [7] argued that kitchen cupboards are generally hung unnecessarily high and this makes their use difficult and may cause some accidents. Similarly, Sözer [8] reported that if necessary care is not given for the design of kitchen equipment elements, recondition may be required for solving the problems to be faced subsequently and well-designed insertions must be done.

The first condition of usability of house spaces is to properly make for the purpose of use of these spaces. Therefore, spaces should be designed properly for their function within the scope of requirements determined the purpose of use. It is unlikely to come across this case in houses built to meet rising house need. Some of the main reasons of this are restrictions concerning the rapid population growth, economic conditions and socio-cultural change. Therefore, it is impossible to provide a design for each user especially in apartment houses and a general design is made mainly in line with virtual requirements. This is clearly seen in the construction of apartment houses appealing to low, medium and high SES users in order to meet rising house need at the present time. Mass Housing Administration (TOKİ) meets a great majority of this rising house need in Turkey. TOKİ has built about 700.000 apartment houses until now. Some examples of these houses built by TOKİ in Turkey are given in Figure 1.

Kitchens of these apartment houses built by construction technology developed in Turkey are prototypes and users generally face with a kitchen built by TOKİ/contractor. Users using these apartment houses should question the conditions of comfort and satisfaction. For example, the conditions of comfort and satisfactions of houses built by TOKİ are handled in [9-12]. In a study that Sak [11] carried out in a mass housing in Istanbul, it was stated that prototype kitchens were not suitable for user profiles and the user satisfaction remained at medium level and so requirement-oriented unique designs should be provided for user in order to increase the user satisfaction. In the studies of Dobrucalı et al. [9], it was reported that the satisfaction level for interior equipment of mass housing kitchens built after the earthquake in Sakarya city of Turkey decreased depending upon the increase in education level of users. It was understood from these researched that positive/negative effects of apartment house kitchens having similar architectural characteristics on functional and perceptual performance of users living in different cities and having different education levels were not questioned adequately.

### **1.1. Aim and Hypotheses of the Study**

In this study, it was aimed to assess perceptual-behavioural performance of users in the kitchens of houses built by TOKİ, located in the Campus of Konya Selcuk University and



used mainly by the members of university. Within the scope of this aim, the following four hypotheses ( $H_1$ - $H_4$ ) were tested.

$H_1$ : Architectural form and size of about 11 m<sup>2</sup> kitchens within the research will affect adversely the satisfaction of users.

$H_2$ : Storing capacity of "I" type kitchen cupboards in the kitchens within the research is inadequate.

$H_3$ : Depending upon the increase in the number of individual living in these houses, the inadequacy of storing capacity of cupboards will rise.

$H_4$ : Perceptual-behavioural performance of users can vary depending upon their education levels. Within the scope of this approach, the fourth hypothesis of the research was created as "Users having taken secondary education have a more positive approach in their perception of environmental factors of kitchen space than users having taken higher education."

A detailed evaluation survey about kitchen space was prepared to test the research hypotheses asserted above and was also applied to parents living in these houses. The results obtained in this study were comparatively evaluated within the text.

## **2. MATERIALS and METHOD**

### **2.1. Research Environment**

This research was made in the apartment houses of Konya Selcuk University given in Figure 2. The same type and the same size of all kitchens in the houses chosen were considered necessary for an accurate comparison. The houses of Selcuk University have 6 floors and consist of total 523 flats, 4 of which are in each floor. Each flat were designed as 3 bedrooms and 1 living room. All furnished plans and images including I type kitchen cupboards made of melamine coated chipboard are given in Figure 3.

The dimensions and capacity measures of cupboards in the kitchens within the research are given in Table 1.

### **2.2. Design of Survey and Procedure**

Data concerning the variables forming the hypotheses of research were evaluated through a detailed survey. The survey form consists of four sections. General information was included in the first section of the survey. Information about kitchen space was included in the second section of the survey. Information on equipment elements was given in the third section and information on the perception of kitchen space was given in the fourth section of the survey.



The surveys considered valid and reliable in the researches made before [1, 13-17] were used in the design of the evaluation survey of house kitchen. In the evaluation of perceptual quality of the kitchen, five-step (1:positive, 5:negative) semantic differential scale listed from positive to negative (free / limited-restricted, tidy / untidy, planned / unplanned, roomy / cramped, restful / disturbing, interesting / ordinary, light / dark, quiet / noisy, uncrowded / crowded, warm / cold) was used.

Data was obtained through a survey by the technique of face-to-face meeting within about 15 minutes at midday hours on weekdays during one-month period in 2015 from the users of 62 houses randomly chosen by sampling method among 528 apartment houses located in the campus of Selcuk University.

### **2.3. Evaluation of Data**

Percentage values, arithmetic averages and standard deviation values of research data was calculated in order that data obtained in the research can be understood and compared with data obtained in similar ways, Pearson Chi-Square test was used in order to test whether the differences/relationships between dependent and independent variables are statistically significant at  $P < 0.05$  level or not. Additionally, data were expressed graphically in order to compare the averages of variables with each other.

## **3. RESULTS and DISCUSSION**

The research environment consists of the kitchens of apartment houses in Selcuk University. The results obtained from these kitchens were given respectively below.

### **3.1. User Profiles**

General information about users living in the houses of families within the scope of the research was given in Table 2. According to Table 2, it is seen that 64% of users are females, 27% of whom are at 18-29 age groups, 39% of whom are secondary school graduates. Moreover, 1-2 person/people is/are living in 16% of houses, 3 people are living in 26% and 4 or more people are living in 58% of houses. In the Pearson Chi-Square test made, there was no significant difference statistically at  $p < 0.05$  level between the numerical distribution of age groups and genders. However, it was found that there was a significant different statistically ay  $p < 0.05$  level between the numerical distributions of the number of persons living in the houses and education groups.

### **3.2. House Ownership and Duration of Residence**

House ownerships and durations of settlement of families within the research were given in Table 3. According to Table 3, 65% of users are householders, 35% whom are tenants.



Additionally, it is seen that 27% of users have been residing for 1 year and 73% of whom have been residing for 2 or more years.

### 3.3. Functional Performance Analysis of Kitchen

Actions except preparation, cooking, washing and storing made in kitchens and spaces for dining in the houses within the scope of the research were given in Table 4. According to Table 4, 73% of users reported that they have their lunch/dinner in the kitchen and 21% of whom have their lunch/dinner in the living room. Additionally, it was determined that the following actions were done as: breakfast in 69% of kitchens, sitting/resting in 19% of kitchens, TV watching in 16% of kitchens. The user satisfactions concerning their kitchens within the research were given in Table 5. According to Table 5, it is seen that the satisfaction rates of users mainly for the kitchen size (19%) and the kitchen architectural plan (36%) are too low. This results supports the hypothesis asserted in  $H_1$  "Architectural form and size of about 11 m<sup>2</sup> kitchens within the research will affect adversely the satisfaction of users." Looking at the percentage value, it was found that there was a significant difference between the user evaluation of size and architectural plan of the kitchen.

Equipment elements that the users included in the research need additional cupboards in their kitchens were given in Table 6. According to Table 6, it is seen that 48% of users wants dry foods storage bins in addition to available cupboards in their kitchen. This result shows the inadequacy of storing capacity of cupboards.

Modifications that users included in the research made in their kitchen cupboards were given in Table 7. According to Table 7, it was reported that 46% of users used their kitchen cupboards delivered by TOKİ as their original form, 23% of whom changed their kitchen cupboards, 20% of whom had additional cupboards and 12% of whom wanted to change their cupboards.

The complaints of users included in the research about their kitchen cupboards were given in Table 8. According to Table 8, it is seen that 60% of users find their kitchen cupboards insufficient, 31% of whom find the material of kitchen cupboards of poor quality. This result supports the hypothesis asserted in  $H_2$  "Storing capacity of "I" type kitchen cupboards in the kitchens within the research is inadequate."

The modifications made by users included in the research for their countertops were given in Table 9. According to Table 9, it was reported that 53% of users used their countertops delivered by TOKİ as their original form, 31% of whom changed their



countertops, 5% of whom had additional countertops and 11% of whom wanted to change their countertops.

Accordingly, 39% of users changed their countertops, had additional countertops and this results correspond to the results given in Table 7. The kitchen user generally has their cupboards and countertops changed at the same time.

The complaints of users included in the research about their countertops were given in Table 10. According to Table 10, it is seen that 42% of users find the dimensions of their countertops insufficient and 37% of whom find the materials of their countertops of poor quality.

The relationship between the storing inadequacy that user included in the research experienced in their kitchen equipment elements and the number of family members was given in Table 11. According to Table 11, Pearson Chi-Square Test was used in order to determine whether there was a relationship between the storing inadequacies that user included in the research experienced in their kitchen equipment elements and the number of family members. As a result, it was found that there was a significant relationship at  $p < 0,05$  level statistically between the number of family members (2 people or less, 3 people, 4 people or more) living in the houses and the storing inadequacy (Chi square=6.637; df=2;  $p=0.036$ ). It was understood from these results that when the number of family members living in the houses was more than 2 people, the storing inadequacy became a complaint. This supports the hypothesis asserted in  $H_3$  "There is a direct proportion between the increase in the number of individuals living in the houses and the storing inadequacy of cupboards."

### **3.4. Perceptual Performance Analysis of the Kitchen**

Cronbach alpha reliability coefficients of the factors that cover the evaluation on the spatial quality of the kitchen according to the semantic differentiation scale consisting of the adjective pairs of the users are 0.874. According to some researchers (18,19), alpha reliability coefficient for all factor are accepted as "reliable" when they are over 0.60. It has been observed that reliability level of the Cronbach alpha value is high in this study. For that reason, these factors are considered to be "reliable".

In this section, whether there is an effect of the differences between the age (18-29 and 30-60) and gender levels (women, men) of the users on the perception of spatial quality of the kitchens that have been researched on or not has been specified. Table 12 shows



the categorical averages of the data obtained in the "residence kitchen environmental factors evaluation survey" from the users and standard deviation values.

When look at the average values given in the Table 12, 18-29 age users have more positive perception to the environmental factors of the space compared to the 30-60 years old and men have more positive approach than women do.

In conclusion, when we look at the differences between the age and gender groups, while 18-29 aged users have a more positive perception of the environmental factors of the space than those aged 30-60 and men have more positive perception than the women.

Figure 4 show the average values with respect to the perception of the users on the environmental factors of the kitchen as graphics.

Table 12 also shows the perceptual evaluations of the users according to the education levels. When look at the average values given in the Table 12, users with secondary education have more positive approach in the perception of the environmental factors of the space when compared to those with graduate higher education. According to the results of the ANOVA test, there is significant difference at the  $p < 0.05$  levels in statistical manner for the adjective pairs such as tidy / untidy ( $F: 5.289; df: 1; Sig.: 0.023$ ), planned / unplanned ( $F: 6.252; df: 1; Sig.: 0.014$ ) and roomy / cramped ( $F: 6.485; df: 1; Sig.: 0.012$ ) between the evaluation of the education groups. These results show that parallel to the increasing level of the education of the users, perception of the environmental factors of the kitchen develop negatively. In conclusion, it supports the hypothesis of "The users with secondary education have more positive approach than the users with higher education on the perception of the environmental factors of the kitchen" set out in the  $H_4$ .

#### **4. CONCLUSIONS AND SUGGESTIONS**

The functional and perceptual performance evaluation of the users towards the kitchen of the flats of the Konya Selcuk University built by the TOKİ (Housing Development Administration of Turkey) with the help of a survey. The followings are the results and suggestions with respect to the perception of the kitchen space and thin construction elements, features of the equipment elements and spaces where the users, participated in the research, have their breakfast and eat their meals and actions in the kitchen.

- It has been observed that the majority of the users, participated in the research, have their meals at the kitchen (77% breakfast + 73% lunch/diner) and the other





part of them sits/rests (27%) and watches TV (19%) at the kitchen. According to that, while designing the kitchen of the residence, eating, watching TV, sitting and baby-sitting actions should be considered depending on the request and needs of the users and architectural shape and size of the spaces should be designed according to the need.

- It is remarkable that 1/5 of the users of the Selcuk University is satisfied with the size of their kitchen and circa 2/5 of them is satisfied with the architectural plan. According to that, it is required to increase the size and revise the architectural plan of the kitchen that has been made research on.
- The entire kitchens of the research have wall and ground cupboards, counter, sink and table + chairs. Approximately more than half of the users at various ratios are not satisfied due to the lack of dry foods storage bins and some due to the lack of vegetable bin in the kitchens delivered by the TOKİ. Furthermore, half of the users stated that storage capacity of the cupboards is not sufficient. It is understood that people complain about the storing insufficiency depending on the increase of the individual living in the houses. According to that, this result should be taken into consideration while planning the kitchen equipment elements and fixed and ground cupboards, cellar/special purposes cupboards, having sufficient storing capacity depending on the features of the space and number of the user's cupboards should absolutely be considered.
- It has been observed that 10% of the Selcuk University users are not satisfied with the colour of the kitchen equipment elements, 1/4 of the users complain about the low quality of the labour in the production of the kitchen cupboard. According to that, it would be useful that TOKİ pays attention to the quality of the labour during the production of the equipment elements.
- 59% of the users use the kitchen cupboards delivered by the TOKİ as is, 12% change the kitchen cupboards, 13% make additional cupboards and 17% want to change it. It has been concluded that 41% of the users change the kitchen cupboard, made additional cupboards and want to change it. It would be significantly important that original designs fit for the need should be provided to the user to increase the satisfaction in the kitchens in question.
- There are no statistical differences between the age and sex groups of the users who participated in the research.
- It is a remarkable result that majority of the users participated in the survey state that kitchens are ordinary.



The satisfaction of the users can be maximized with the original and interesting designs that satisfy the requests and needs of the users at the optimum level in the scope of the suggestions expressed above.

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## FIGURE LISTS

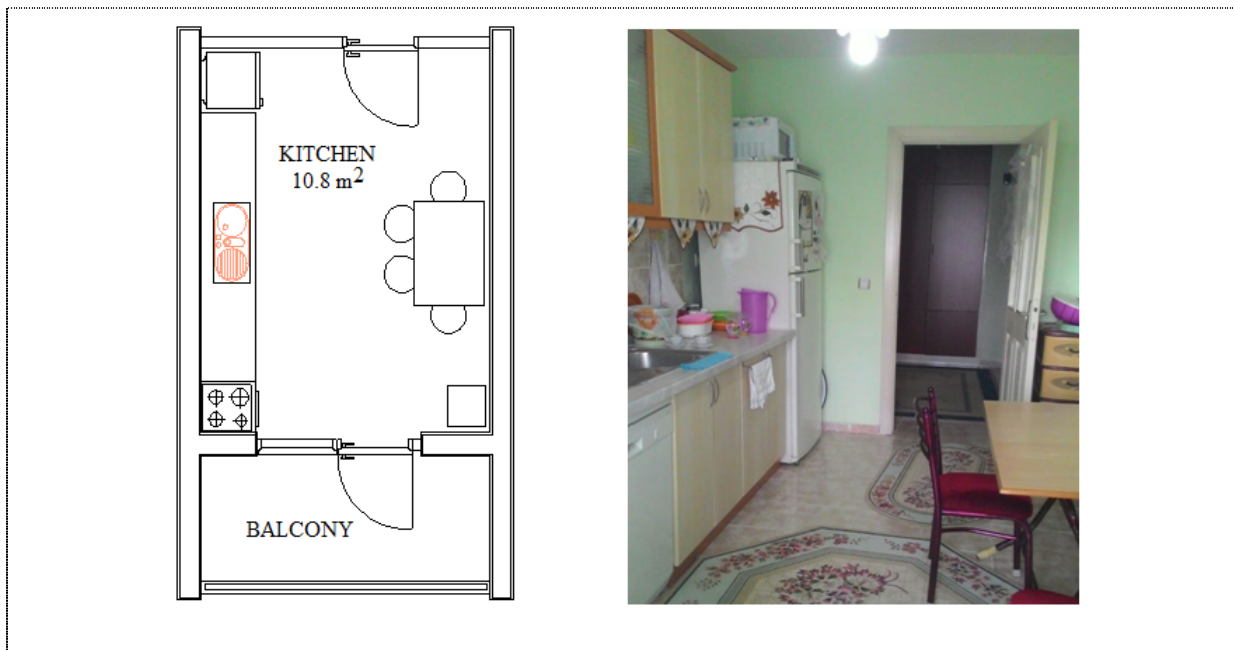
- Figure 1.** Examples of the houses built by TOKİ in Turkey
- Figure 2.** Facades of Selcuk Univesity TOKİ houses
- Figure 3.** Furnished plans and images including "I" type kitchen
- Figure 4.** Average values with respect to the perception of the users on the environmental factors of the kitchen



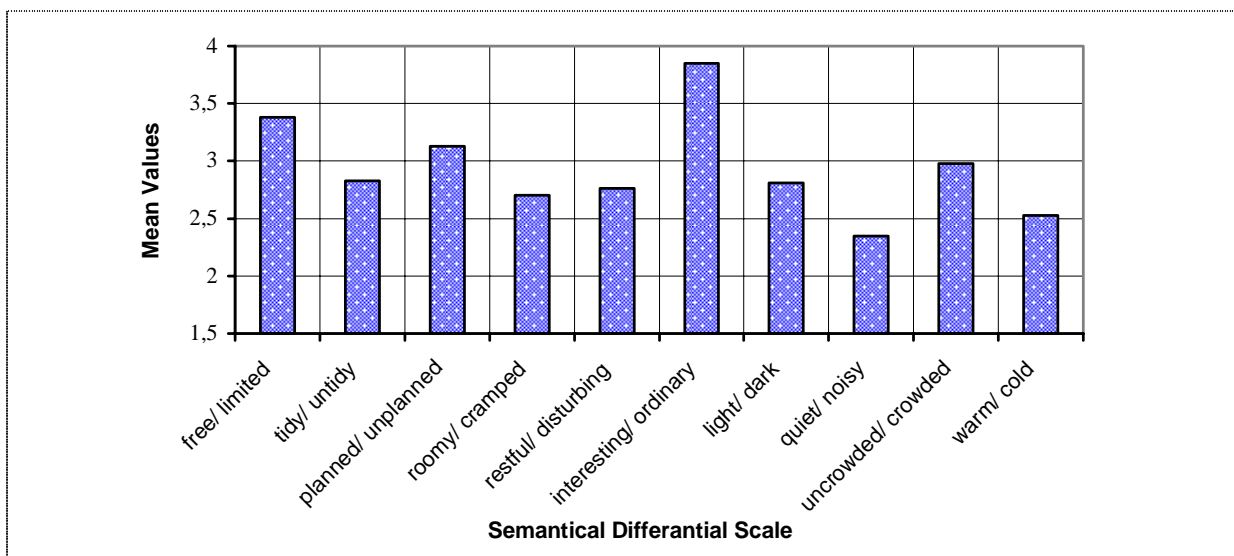
**Figure 1.** Examples of the houses built by TOKİ in Turkey



**Figure 2.** Facades of Selcuk Univesity TOKİ houses



**Figure 3.** Furnished plans and images including "I" type kitchen



**Figure 4.** Average values with respect to the perception of the users on the environmental factors of the kitchen



## TABLE LIST

Table 1. The dimensions and capacity measures of cupboards in the kitchens

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Table 12. Categorical averages of the data obtained from the users and standard deviation values

**Table 1.** The dimensions and capacity measures of cupboards in the kitchens

TOKİ Houses	Kitchen Cupboard Parts	Dimensions (cm)			Piece	Volume *
		Width	Depth	Height		
	Ground Cupboards	90	55	87	2	0,762
Kitchen of Selcuk	Ground Drawer Cupboard	45	55	87	1	0,191
University Houses	Wall Cupboard	90	32	80	3	0,691
	Aspirator Cupboard	60	32	62	1	0,119
<b>Total</b>					<b>7</b>	<b>1.763m<sup>3</sup></b>

Note: \*In the calculation of volume, ground cupboard was assumed as 77 cm .

**Table 2.** General information about users living in the houses of families

General information about users		Selcuk University Houses	
		F	%
<b>Gender</b>	Female	40	64
	Male	22	36
<b>Age</b>	Between 18-29	17	27
	Between 30-60	45	73
<b>Education Level</b>	Secondary	24	39
	Higher	38	61
<b>Number of Person Living in the House</b>	Max 2 person	10	16
	3 person	16	26
	4 person and more	36	58

**Table 3.** Ownerships and durations of settlement of families

Ownerships and durations of settlement of families		Selcuk University Houses	
		F	%
<b>Ownerships</b>	House holders	40	65
<b>Status</b>	Tenants	22	35
<b>Durations of settlement</b>	of 1 year	17	27
	2 year and more	45	73
Total		62	100

**Table 4.** Food renovated spaces and ancillary actions taken in kitchen

Actions except preparation, cooking, washing and storing made in kitchens and spaces for dining in the houses		Selcuk University Houses	
		F	%
Food renovated spaces	Kitchen	45	73
	Hall	13	21
	Dining room	4	7
Ancillary actions taken in kitchen	Living /Resting	12	19
	Watching TV	10	16
	Breakfast	43	69



**Table 5.** The user satisfactions concerning their kitchens

The user satisfaction levels about their kitchens	Selcuk University Houses			
	Pleased		Not Satisfied	
	F	%	F	%
Location of kitchen	44	71	18	29
The size of kitchen	12	19	50	81
The daylight level in the kitchen	41	66	21	34
The architectural plan of kitchen	22	36	39	64

**Table 6.** Required elements needed in the kitchen

Required elements needed in the kitchen	Selcuk University Houses			
	I need		I do not need	
	F	%	F	%
Dry foods storage bins	30	48	32	52
Vegetables board	14	23	48	77

**Table 7.** Modifications that users included in the research made in their kitchen cupboards

Status of the modifications in the kitchen cupboards	Selcuk University Houses	
	F	%
I'm using existing cupboard	28	46
I have changed existing cupboard	14	23
I made additions to existing cupboard	12	20
I want to change existing cupboard	7	12

**Table 8.** The complaints about the kitchen cupboards

The complaints about the kitchen cupboards	Selcuk University Houses			
	I agree		I do not agree	
	F	%	F	%
Very High	5	8	57	92
Inadequate Storage	37	60	25	40
Less Cupboard Depth	4	7	58	93
More Cupboard Depth	2	3	60	97
Poor Material Quality	19	31	43	69
I do not like color	13	21	49	79





**Table 9.** The modifications made by users for their countertops

Status of modifications	Selcuk University	
	Houses	
	F	%
Used in original form	33	53
Changed	19	31
Added to the existing countertops	3	5
I want to change countertops	7	11

**Table 10.** The complaints of users about their countertops

The complaints about their countertops	Selcuk University Houses			
	I agree		I do not agree	
	F	%	F	%
Very High	5	8	57	92
Inadequate Storage	37	60	25	40
Less cabinet depth	4	7	58	93
More cabinet depth	2	3	60	97
Poor material quality	19	31	43	69
I do not like color	13	21	49	79

**Table 11.** The relationship between the storing inadequacy and the number of family members

Number of family members	Selcuk University Houses			
	I agree		I do not agree	
	F	%	F	%
Max 2 person	3	5	7	11
3 person	8	13	8	13
4 person and more	26	42	10	16
<b>Total</b>	37	60	25	40
<b>Pearson Chi - Square Results</b>	$X^2: 6,637, df: 2, P: 0,036 < 0,05$			



**Table 12.** Categorical averages of the data obtained from the users and standard deviation values

Adjective Pairs	Age				Gender				Education Level			
	18-29		30-60		Female		Male		Secondary		Higher	
	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
<b>free/limited</b>	2,76 <sup>a</sup>	1,28	3,01	1,51	3,05	1,54	2,73	1,25	3,41	1,55	3,36	1,40
<b>tidy/untidy</b>	2,13	1,21	2,43	1,39	2,33	1,39	2,35	1,26	2,45	1,44	3,07	1,49
<b>planned/unplanned</b>	2,31	1,23	2,70	1,53	2,53	1,48	2,65	1,41	2,70	1,62	3,40	1,48
<b>roomy/cramped</b>	2,18	1,17	2,32	1,43	2,30	1,39	2,24	1,29	2,13	1,54	3,05	1,48
<b>restful/disturbing</b>	2,08	1,03	2,51	1,38	2,26	1,31	2,55	1,27	2,56	1,70	2,88	1,40
<b>interesting/ordinary</b>	3,57	1,00	3,85	1,22	3,85	1,20	3,62	1,09	4,16	1,23	3,64	1,37
<b>light/ dark</b>	2,21	1,18	2,49	1,42	2,35	1,36	2,48	1,34	2,62	1,55	2,94	1,30
<b>quiet/noisy</b>	1,89	0,92	2,30	1,38	2,17	1,31	2,17	1,19	1,91	1,38	2,63	1,49
<b>uncrowded/crowded</b>	2,18	1,15	2,71	1,54	2,62	1,52	2,42	1,33	2,50	1,56	3,28	1,52
<b>warm/cold</b>	2,31	0,96	2,51	1,19	2,34	1,14	2,62	1,09	2,37	1,31	2,63	1,40

Not: S = Standard Deviation;  $\bar{X}$  = The average variable

<sup>a</sup>: Variable averages ranked from 1-5; large numbers are more negative answers.