

Assessment of University Staff Flats in Riyadh Based on Judgement Made by Their Users

Mahmoud M. Idris

*Department of Architecture & Building Sciences
College of Architecture and Planning
P.O. Box 57448, Riyadh 11574
King Saud University, Saudi Arabia*

(Received 10/5/1420 H; accepted for publication 9/11/1420 H)

Abstract. This article attempts to evaluate the patterns of usage of living spaces in standard design flats and the factors determining this use as judged by their inhabitants. For this purpose a post occupancy survey was carried out among a random sample of King Saud University staff flats in Riyadh (of standard design), to assess such a situation. Findings have shown that most of the users complaints are a result of the inadequate number and size of rooms, lack of privacy, small storage area and the poor environmental conditions within the flats. Hence, in search for effective solutions to satisfy the inhabitants needs and requirements; it is essential to look into previous housing experiences of potential users, their life style and their cultural background.

Introduction

Any researcher dealing with housing faces a much complex problem than the provision of shelter. Although it is critical to supply shelter for everyone, the quantity and quality of dwellings do not by themselves solve the housing problem. Dwellings must meet the expectations and living patterns of their users [1]. Although human-beings have certain spatial-physical needs, there are still considerable individual differences regarding these needs, and preferences for the physical space [2]. This means that the design of living spaces, and the construction of the physical shell of the dwelling, should reflect the actual needs of the users. This may be difficult to achieve due to the following [1,3]:

1. The continuous changes in the social and economic status of the families, and their life cycle.
2. The quality of housing varies in accordance with a series of factors such as engineering, environmental, economic, behavioral and others.
3. The client and user is no longer the same person.

Eventually, dwellings are been designed and built in accordance with certain economic and technological considerations, rather than with serious attention to the emotional impact and aspiration of their users [4].

However, this article attempts to study the problem of accommodating people in flats with standard design focusing on the evaluation of the inhabitants and the judgement of such type of housing, and its suitability in terms of needs and wants. For this purpose a pre-occupancy survey was carried out among a random sample of household heads living in King Saud University (KSU) staff flats. Notes on the housing situation in Saudi Arabia and a literature review on housing satisfaction and post-occupancy evaluation (POE) are given, to furnish the article with theoretical background. Then a brief description of the study area, the household survey, together with the analysis of findings, discussion and final conclusions are given.

Housing Situation in Saudi Arabia

Generally, the basic problem of housing in the Gulf region does not lie in the need for shelter as much as the need to upgrade its physical and spatial environment. According to the Fifth Development Plan of the Kingdom (1990), the investment in housing was the single largest category amounting to over 10% of the total investment. The plan also touched on the problem of sub-standard and deterioration of some housing stock both in rural and urban areas, and the need to develop a National Building Code, and also to establish a reliable data on housing standards.

As for the quality of housing, many studies by Saudi researchers have shown that solutions to housing schemes are detached from indigenous concepts. According to Talib [5], low and high-rise apartment buildings are relatively new phenomenon in the cities of Saudi Arabia. In the early 1960's apartment building activity boomed for housing Saudi as well as foreign workers. These new form of housings were designed completely alien to the traditional pattern. Their design was often based on designs built elsewhere, or designed by architects who are not necessarily concerned with climatic or cultural contexts of the country. Although those designs are visually and technically impressive, they are designed with little sensitivity to the life styles and needs of their users [6].

Fadan [7], asserts that the decision taken in 1953 to transfer the government offices from Jeddah and Makkah to Riyadh, had created a demand for large housing schemes to accommodate the huge number of workers and government employees. In order to do so, and to build large housing to accommodate the incoming people to the new capital, the government decided to ease pressure on local house-building industry. In reviewing the contemporary provisions of mass housing, one can see that the major role is played by the decision-makers, foreign architects and foreign firms. On the other hand Bahamman [8] sees the problem of housing in Saudi Arabia as: "been based on an imported model that was not evolved according to the needs of residents nor developed from the traditional housing model". He added that: "this model was

introduced by the Arabian-American Oil Company, ARAMCO, and adopted as a model for contemporary housing. Since this model was originally developed for different occupancy, contemporary housing seem quite unlikely to meet the socio-cultural needs of the local residents”.

In another study Mofiti [9] compared the rate of satisfaction of occupant of traditional dwellings with those of modern housing in Riyadh. He found that the traditional dwelling is preferred in many aspects. In his study, Mofiti used a 10 points rating scale to evaluate occupants’ preferences – in both traditional and modern dwellings – with respect to privacy, cultural norms like eating, sleeping and entertaining, as well as the ability of the dwelling to meet the changing needs of space according to family life cycle. The traditional dwelling has shown superiority over the “modern” house in all aspects.

Al Tassan [10] conducted a field investigation to evaluate the users’ preferences and needs of five low-rise housing flats built between 1973-1980. Findings of his study revealed that these housing projects depended heavily on imported technology and design. Regarding the KSU housing flats (built 1973 and were occupied since 1977), he asserted that the technical limitations of the selected system and the unfamiliarity of the designer with the local culture and social values of the Saudi Society, badly affected the quality of the floor plan.

It follows from these studies that the problems of housing in Saudi Arabia can be summarized as follows:

1. The users are not involved in the decision-making regarding the design of their housing units.
2. Solutions disregard indigenous concepts of housing and living style of Saudi families.
3. Adoption of imported housing models, not suitable to social norms and environment of Saudi Arabia.
4. Use of technologies and forms alien to urban and rural patterns.
5. Total dependence on artificial environment, which consumes more energy.

The above mentioned problems form a big area for research in the field of housing. However, the main objective of this article is to evaluate the type and the quality of living spaces of a standard design flats of KSU as judged by the occupants living in them, using a pre-occupancy survey. The results of this study may be useful to the concerned bodies, since it took place 10 years or more after the 1986 study by Al-Tassan.

Housing Satisfaction

Housing literature reveals a number of factors, which affect housing satisfaction. These factors are so complex that it is difficult to analyze any of them in isolation of the others. Such factors vary from one community to the other. Also since the occupants’ satisfaction is not permanent, it follows that the quality of the dwelling unit or the

occupant satisfaction at a certain point in time can be defined only in relative terms.

According to Seon [3], the actual satisfaction of the occupants can be defined in two ways: *as a clear explicit declaration by the occupant that the apartment pleases him, or as the absence of a complaint when an opportunity to complain about the apartment is given to the occupant.* In different studies one finds, a positive correlation between occupants' satisfaction with his apartment and various specific factors. For instance, Mogeey [11] and Morris [12] found that satisfaction depends on a whole system of beliefs and opinions that the occupant entertains in respect to his dwelling and which are not connected with its physical characteristics. Other researchers connected satisfaction with the value of the apartment in the market [13], or to a function of the occupants neighbours [14], or to the number of rooms per family and the possession of a private bathroom and kitchen [11]. On the other hand, Wilner, Walkley and Cook [14] considered satisfaction to arise from the absence of various nuisances, whereas Oates [16] maintained that the level of services supplied by the local authority is a contribution to satisfaction.

These studies have shown that satisfaction is a function of a whole series of factors. The occupant's satisfaction with his dwelling, depends to a large extent on the key question of whether the dwelling unit meets his needs, his life style and his life cycle. Answers to these questions depend on the occupant's priorities, cultural background and past housing experience. Regarding the KSU housing, the staff's living in these flats come from various countries of different cultural backgrounds and housing experiences.

The Post-occupancy Evaluation (POE)

Post-occupancy evaluation (POE) is defined by Zimring and Reizerstei [17] as: "The examination of the effectiveness of the designed environments for human users". POE is therefore, an investigation of the designed environment with regard to its human users. According to Rreiser *et al* [18], POE is the process of evaluating buildings in a systematic and rigorous manner after they have been occupied for sometime. This process focuses on building occupants and their needs and thus provides an insight into consequences of past design decisions, and the resulting building performance.

Hence, the goals and applications of POE can vary widely from feedback to the evaluated building for immediate problem solving, the documentation of successes and failures in building performance, to auditing or other focused inquiries into building performance. Coupled with that, there are several qualities which tend to characterize POE which have to be considered [17]. These are:

1. POE tends to focus on a single type of building or other designed setting such as housing, offices ... etc.
2. Evaluators tend to describe rather than analyze a setting.
3. The work is always conducted in actual setting rather than laboratory.

Consequently the use of POE as a research tool in this study is well justified. Moreover, the occupants of the KSU housing flats played an important role in providing the required data as set in the questionnaire and interviews.

Study Area: KSU Housing Flats

The King Saud University (KSU) staff housing flats contain 672 flats arranged in three and four stories high-rise blocks, encompassing an area of 22.1 hectares. Three types of accommodation are available: one-bedroom flats (111 units), two-bedrooms flats (336 units) and three-bedroom flats (225 units) Fig. 1. The buildings have been occupied since June 1977.

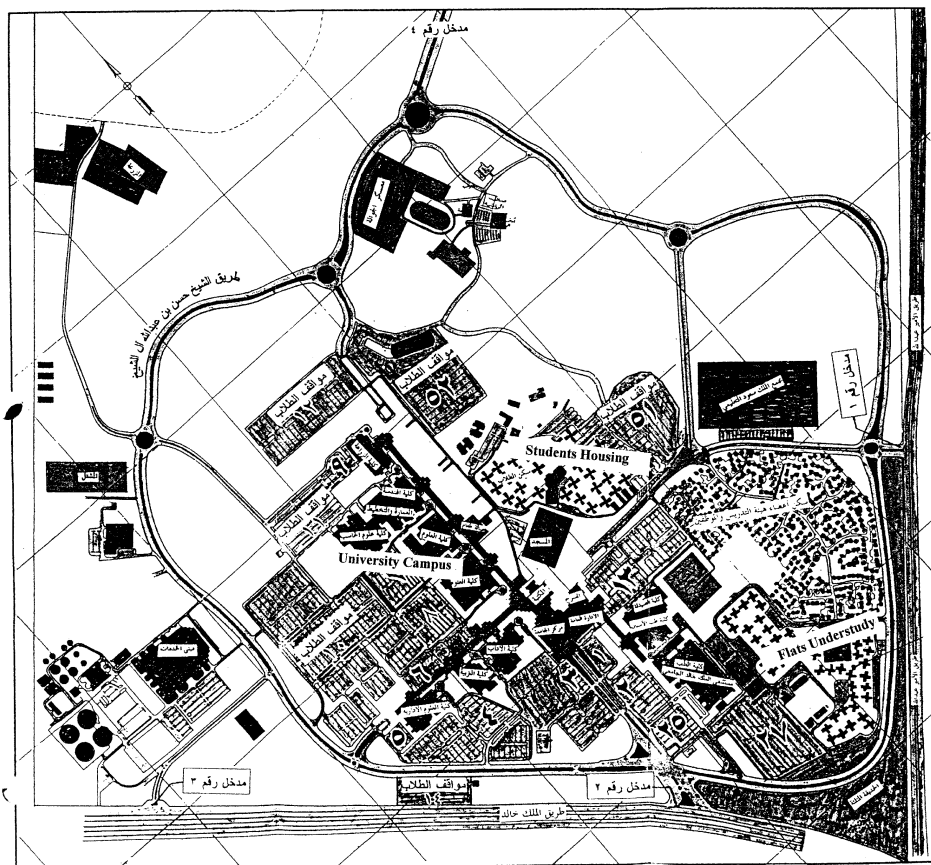


Fig. 1. Location of flats.

The main concept of the design of the flats is based on a central corridor (120cm wide) along which the rooms are arranged, with the main entrance of the flat and a guest bathroom at one end of the corridor and the main bathroom at the other end. Each room is provided with one window (90cm wide) placed at one corner and one door (85cm wide) open to the corridor. The four flats on each level are arranged in a cross-like shape stemming out from a central hall. The central hall contains the main vertical circulation core including a lift and stairs and two rooms at each floor accommodating the AC machines, Fig. 2. The flats are constructed of 15cm thick pre-cast reinforced concrete load bearing panel walls and 15cm thick r.c. plate slabs on the floors and roof. A total system of pre-cast reinforced concrete fabricated in a factory and assembled at the site is used. The system does not offer any design flexibility. No thermal insulation is provided on the walls or floors. The roof finish consists of one ply bituminous felt on two coats of melted asphalt water insulation with 5cm extruded polystyrene thermal insulation on the top of the water insulation and 2cm thick concrete tiles on 2cm bedding as final finishing layer.

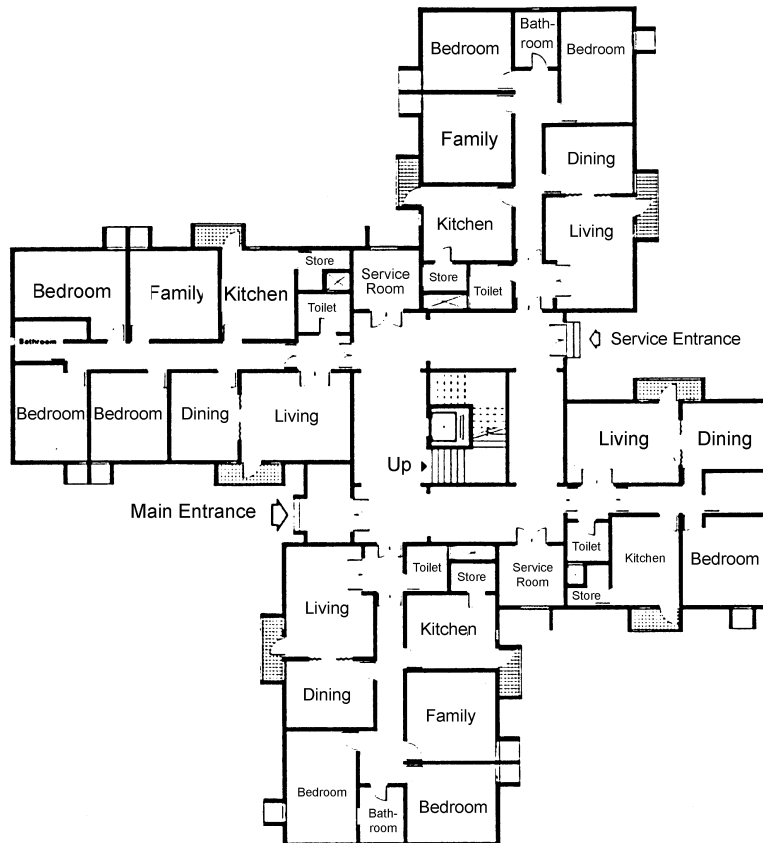


Fig. 2. Layout and types of flats. Scale: 1:300

Household Survey

Data was collected by means of a survey interview using a form of designed questionnaire. Each household was requested to respond to a questionnaire containing a total of 43 questions arranged into four groups. The first group contains basic information about the type of flat and building number and location as well as family structure, age, sex, length of residence and nationality. The second group sought information about aspects concerning the internal spatial relationship and their pattern of use. The third group sought information about the occupants satisfaction with the internal environment of the flat. Such questions deal with the use of various spaces, type and use of curtains, windows, doors, kitchen, storage, bathrooms and the central corridor. The fourth group explores the occupants' opinions about the balconies and the external spaces surrounding the flats. Each section contains a group of questions dealing with certain aspects within the section. At the end of each question, residents are asked to give their personal views - their likes and dislikes - about their flat. In addition a letter outlining the nature and purpose of the

survey is attached with the questionnaire.

The Random Sample

The questionnaire was not directed to specific occupants or type of flat. Households from different nationalities including: Saudis, Pakistanis, Egyptians, Sudanese, Indians, Syrians, Jordanians and American Arabs have responded. In his research Al-Tassan [10] had limited his sample to Saudi staff who lived in the flats for not less than two years.

About 100 questionnaire forms were distributed and 52 answered forms were received. The answers received are distributed among the flat-types as follows: 5 from the one-bedroom flats, 18 from the two-bedrooms flats and 29 from the three-bedrooms flat. The outcome of the finding is analyzed in the following pages.

Findings

The basic information

The total population living in the 52 flats is 262 persons with an average of 5.04 persons/family (6.0 persons/family is the Saudi national average). The survey shows that the one-bedroom flats have an average of 1.8 persons per family and that the two and three-bedrooms have an average of 4.5 person per family and 5.7 person per family respectively. The maximum number of persons per family within the one-bedroom flats is 4 persons and the minimum is 1 person. As for the two-bedrooms and three-bedrooms flats, the maximum number of persons is 6 and 8 persons and the minimum is 3 and 3 persons respectively. The calculated space standard (in m²) for the three types of flats based on the total area of each flat and the average number of persons per family is 41.2m² per person for the one bedroom that, 25.7m² per person for the two-bedrooms and 22.9m² per person for the three-bedrooms flat respectively, Fig. 3.

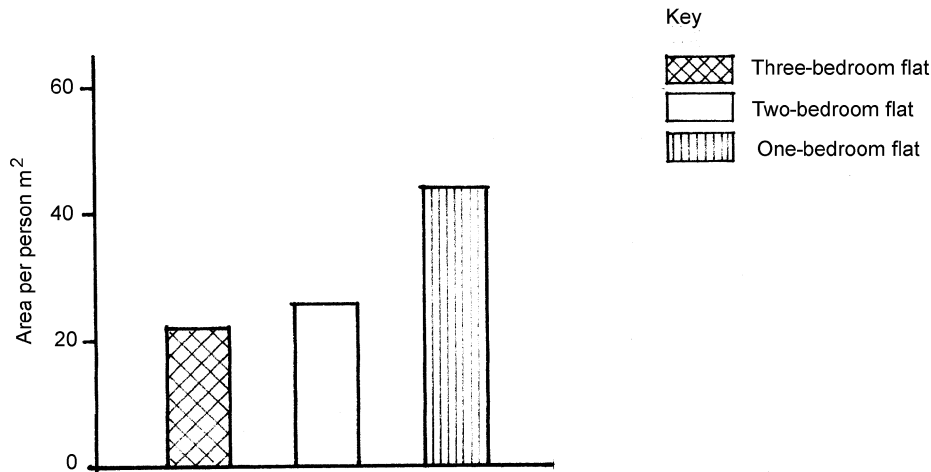


Fig. 3. Calculated space standard in m² per person.

As far as the gender groups there are 76 girls and 82 boys of age between 1 year and 26 years, within the study area. The parents age ranges from 33 years to 60 years for the husbands and 27 years to 48 years for the wives.

The length of residence within the study area varies from 1 year to 17 years. Although the length of residence in any residential area or a particular dwelling can be used as an indicator of satisfaction with the residential environment, however, this may not be valid regarding the case of the King Saud University (KSU) flats. That is because most of the occupants especially the non-Saudis, have a limited choice, since their stay in the flats is linked with the length of their contract with the university is valid.

Use of spaces

The design of livable spaces can be improved by observing the actual family activity patterns of use and the way the various spaces are used and whether the usage conform to the anticipated functions or not. This in a way should help designers to find out spaces which are wasted and those which serve many functions [4]. The indoor space requirements for households depend upon the cultural, social and economic status of the population involved. Indoor space is normally divided into dwelling spaces such as living rooms, bedrooms and kitchen; and ancillary space such as bathrooms, corridor, stairs and storage areas. Table 1 and Fig. 4 give a summary of the areas of spaces of the flats under study. The shape, size and number of rooms should be able to accommodate the activities normally carried out in these rooms [19]. Figure 5 shows the shapes of some spaces within the flats.

Table 1. Summary of areas of spaces of flats

Spaces	Three-bedrooms		Two-bedrooms		One-bedroom	
	Area	%	Area	%	Area	%
Dwelling spaces						
Receptions + Dining	48.00	36.2	46.60	39.3	30.00	39.0
Bedrooms	44.70	33.3%	30.00	25.3	16.00	20.8
Kitchen	13.20	9.9	13.20	11.2	12.00	15.6
Ancillary spaces						
Bathrooms	9.6	7.2	9.00	7.6	8.80	11.4
Storage	2.75	2.1	2.80	2.4	2.80	3.6
Corridor	15.00	11.3	16.8	14.2	7.3	9.6
Total area	133.25	100	118.40	100	76.90	100

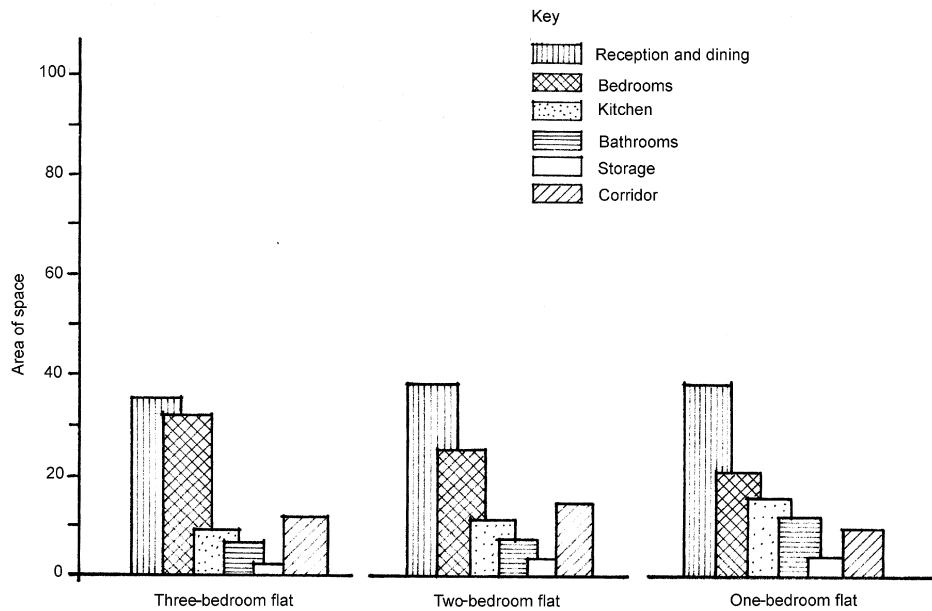


Fig. 4. Comparison of areas of various spaces within the flat among the three types.

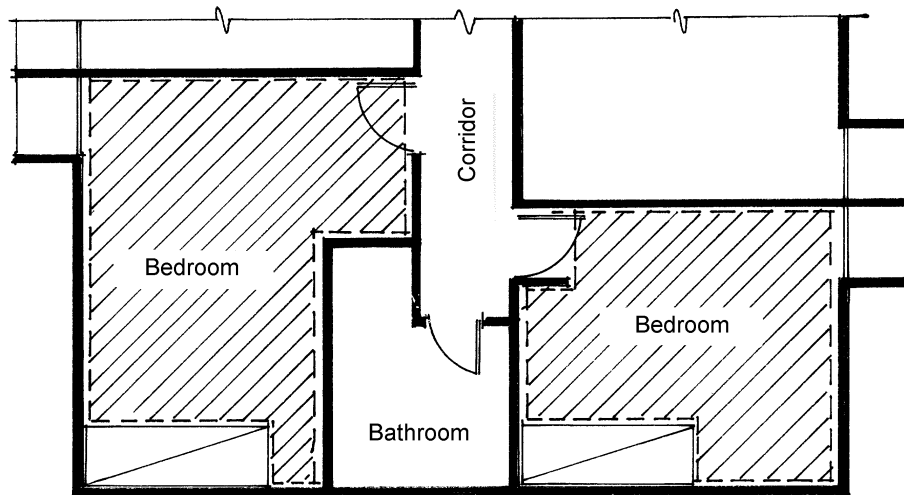


Fig. 5. Shape of internal spaces.

Findings from the post-occupancy investigations have shown various pattern of use of spaces. Also the respondents have provided very useful comments regarding the spatial design and the internal environment of the flats.

Dwelling spaces

Reception + Dining

Except for the five one-bedroom flats, the other 47 flats are provided with extra rooms allocated for women reception. About 22 out of the 47 households (46.8%), have changed the function of the women reception to either a study, children playroom or guest bedroom, Fig. 6. On the other hand, the main sitting room (male reception) remains as it is in all flats. As for the dining room, about (30%) of the households have accommodated other functions like office, male guest room, Fig. 7.

Bedrooms

Most of the households (79%) use of the bedroom comply with that allocated in the original design, except for the other (21%) who used the master bedroom for children.

Kitchen

The investigation reveals that most of the families (88.7%) have their meals in the kitchen beside the main activity of cooking and food storage Fig. 8. The rest (11.3%) use the kitchen for cooking only and take their meals in the main dining room.



Fig. 6. Conversion of women reception into children room.



Fig. 7. Accommodation of other functions with dining room.



Fig. 8. Dining in the kitchen.

Ancillary space

Bathrooms

Most families (75%) are not restricting the use of the main bathroom (located inside the flat) to any group within the family. The other (15.3%) and (9.7%) of the families are reserving its use to the parents and females only respectively. As for the guest bathroom (near the entrance), (46%) of the respondents are reserving its use for guests and the males only while the other (54%) are not defining its use. However, in the presence of guests, the females use the main bathroom and males use the guest bathroom.

Corridor

The central corridor divides the living spaces of the flat discretely into two separate zones unnecessarily. The respondents have shown great dissatisfaction regarding the corridor as a social segregator and as a source of environmental hazards. The respondents have described the corridor as dull (78%), dark (73%) not ventilated (63%) and spread noise (56%). Nearly all respondents (93%) claim that cooking fumes and foul air from bathrooms spread via the corridor to the other spaces in the flat.

Storage area

The storage area allocated for each flat is very small in terms of area and layout.

The storage area is even smaller in the three-bedrooms flat because it is partially occupied by the rubbish chute. This, however, makes the store unsuitable for storing food materials. Only the household equipment, i.e., the vacuum cleaner and booms, are stored in it.

Internal environment

According to Robertlym [20], Walter Gropius summarized the problem of minimum dwelling as that of establishing the elementary minimum space, air, light and heat (thermal comfort) required by man in order that he will be able to fully develop his functions without experiencing restrictions due to his dwelling. However, things become more complicated when spatial separation and physical devices, i.e., doors, windows and curtains are used as privacy filters [21].

Therefore doors and windows are very important devices in controlling the elements of the physical environment, and shaping internal space and eventually one's behavior.

Windows

Each room is provided with one window 90 cm wide and 120 cm high located at one corner of the room. The way the windows size, shape and position are designed indicates that the designers have considered the appearance of the facade of the building rather than the quality of the internal environment of the living space, and the welfare of the occupants. As for their performance, findings from questionnaire reveal that (55%) of respondents open their windows occasionally, and the rest (45%) open them all the time. Windows are opened to change air (53%), have more light (23.6%), for communication (5.4%), and to supervise children playing outside (8%). Windows are closed because of dust (26%), smell (18%), noise (18%), and the sun (16%). Almost half respondents find the window area small (51%), and their position suitable and adequate (49%), while the rest think the window area and position are not suitable at all.

Doors

Respondents attitudes towards doors can be summarised as follows: the doors of the rooms are not wide enough (85cm wide) and fitted with impractical lock which is locked by pressing a knob from the inside and opens by the key from outside only. This causes many problems to families with small children, who sometimes lock the door accidentally with the keys inside the room. Regarding the middle door many respondents (68%) believe that it is important for privacy because it segregates the rest of the rooms from the males' section in the presence of visitors. It also screens the internal space from the outside in case the entrance door is left opened Fig. 9. In addition, some families believe that the middle door acts as an air lock. Most families (76%) added a second lock to the main entrance door for security reasons.



Fig. 9. The central corridor and middle door.

Curtains

Most respondents (68.7%), used double curtains made of light and heavy fabric while the rest (17.6%) and (13%) use only heavy or light fabric materials respectively. About 67% of the respondents open their curtains occasionally, (24%) open the curtain all the time and (9%) keep the curtain closed all the times. Reasons for opening the curtains as reported by respondents varies from having light (50%), view (20%), social interaction (18%) and checking the children while playing (12%). Curtains are closed for privacy (48%), because of the sun (41.2%) and glare (10.3%).

The external spaces

The need for space outside one's residential unit is an important determinant of the quality of life. Residents seem to extend their living space beyond the private spaces within their housing unit [22]. External spaces are needed for social interaction between users and also for children play and recreation. According to Fleming *et. al.*, [23], social interaction is enhanced by the presence of three variables: First the opportunity for contact, second proximity to others, and third appropriate space to interact.

Respondents were asked to express their feeling towards the external spaces and the balconies considered to be an integrated space with the outside.

Outdoor space

The survey shows that 57.2% of respondents do not feel the presence of the external spaces or the surrounding buildings while inside the flat. Furthermore 86% of them do not use the external spaces, because they think they are not designed for families and they are not pleasant, also because of the hard concrete surface finish which makes the spaces dull, inhuman and unsafe for children. As for the play areas children use them during the weekend.

Balconies

There are two balconies in each flat varying in length, but one meter in depth. The first balcony is attached to the kitchen and the second is attached to the sitting room. Both balconies are rarely used for sitting or any social activity, 3% use the kitchen balcony while 8% use the sitting room balcony. However, the balconies are used for other functions. About 50% of respondents use the kitchen balcony for drying laundry while 12% use the sitting room balcony. On the other hand, 32% and 31% of the respondents use the kitchen and sitting room balconies as storage area respectively. The reasons given by the occupant for not using the balconies for social activities were that, the balconies are small, narrow, and difficult to clean, not safe for children and have no privacy, in addition to the bad odor coming from the nearby rubbish chutes, and the severe weather conditions.

Discussion

The dwelling represents a symbolic type of space, a home base, an anchorage point the favored means for family unit to appropriate space [24]. The judgments made by inhabitants regarding their housing are based on an overall assessment of their housing situation. Since it is the designer's task to design the spaces for certain group of users, it is helpful to acquire data on certain personalized and social setting variables which influence the spatial needs [2].

Regarding the KSU flats, there are a number of points which have to be considered in the evaluation:

1. The flats are the property of the University, and therefore the users have limited or no preference.
2. The three types of flats have the same construction system, materials and layout, but different orientations.
3. The inhabitants are from various countries of different ethnic and cultural background and housing experience.
4. All the respondents are Muslims.

In view of these points it is important to realize that it is not easy to satisfy the needs of all the users especially in mass housing projects. That is because of the conflicting way of the spatial order the individuals have. This is even more difficult in

the case of the flats understudy, because of the different ethnic and cultural background of the occupants. However, in such circumstances it is helpful to find common areas of interest which satisfies most of the users. Such common area could be based on the following facts:

- * The Muslim society of Saudi Arabia.
- * The tropical continental climate of Riyadh.
- * The inhabitants are academic staff of the University.

Unfortunately none of these points are reflected in the design of the flat.

Opinions expressed by the different nationalities of respondents represented in Table 2 and Fig. 10 reveal that lack of privacy, the boring internal living environment and the long dark corridor within the flats are the major causes of dissatisfaction. Also, the flats lack some spaces, like a family living hall, adequate storage area and a private working station (study area). As for the external space around the flats, respondents feel it is not designed for family use or landscape in a way to improve the quality of the external environment.

Table 2 Opinions of the various nationalities of respondents

Respondents' opinions	Nationality or country					
	Saudi	Sudan	Egypt	Syria Jordan Turkey	India Pakis- tan	USA Arab
1. No privacy within the flat	100%	75%	40%	30%	66%	66%
2. Boring internal living environment	60%	60%	60%	30%	50%	100%
3. Long dull, dim socially retarding corridor	60%	65%	60%	28%	50%	66%
4. Family hall is needed	60%	65%	60%	45%	66%	66%
5. Private office space is needed	42%	36%	20%	15%	33%	33%
6. More storage area is needed	57%	36%	40%	28%	40%	100%
7. Use of the balcony	0.0	25%	60%	28%	50%	66%
8. Dull unusable external spaces	42%	40%	65%	28%	50%	66%

Findings from this study reveal that all the respondents are Muslims. The prime variable for Muslims is the segregation of space of gender [25], which is common in all Muslim societies. Thus this situation should involve implementation of more privacy measures. However, as for the existing design of the flats this matter is not fully observed. Although the designer provided a separate reception room for women, yet it was located deep inside the flat near the master bedroom. This has created some difficulties for men who may be inside the flat (in the master bedroom) in the presence of female guests. Moreover privacy within the flat is achieved by closing doors, windows and drawing curtains. This has created many problems like lack of ventilation, dark corridor, and isolation of users.

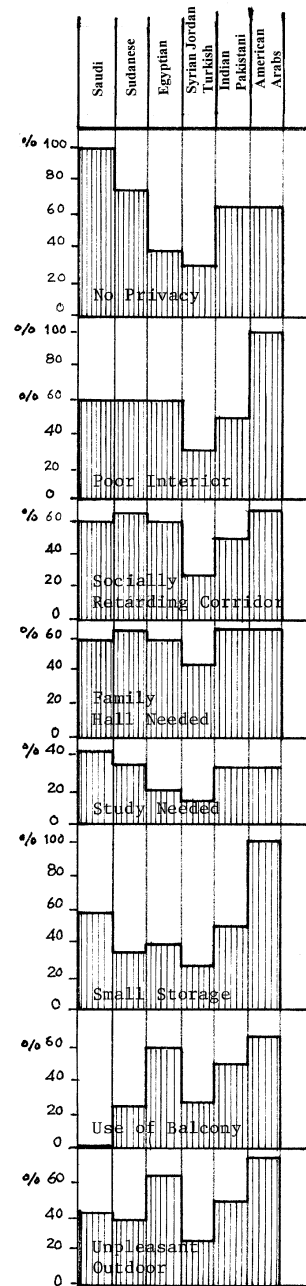


Fig. 10. Rate of satisfaction of the various nationalities with their flats.

The small size rooms coupled with the absence of a family living space have further aggravated the feeling of isolation among the members of the family. This is mainly due to the layout of the different rooms along the central corridor. The central corridor is not appreciated by most of the users because they believe it confines the different members of the family to a certain room, and restricts their integration and association with each other. In addition respondents claim that the cooking smell and fumes spread through the corridor. However, that is because in most of the times the kitchen's doors are left open during cooking (73%). According to (Robertlym [20]), cooking is one type of activity which plays a significant role in the spatial design of the flat and its internal environment. The specific way of cooking by the different societies including the type of spices and material, generate some fumes or cooking smell if not catered for may cause unpleasant environment within the spaces in the flat. Also the foul air from bathrooms, as reported by 93% of respondents is spreading via the corridor all over the flat. That is because the two bathrooms are placed at the two ends of the corridor, and one has no access to the outside.

A preferred method of relating the occupants to the amount of space would be to take into account not simply the number of persons, but also the age, sex and family role of each person [12]. Some respondents (32%) feel that they would like to have a sort of space to use as a study, or even a private corner for their computer. This has made most of the respondents convert the women reception room or the dining room into a work station and a study room for the children. Also, some adjustment and adaptations of spaces are made by users by converting some spaces like the dining room and women reception room into bedrooms for children, or guests room, or a study corner. Others have gone even further and closed the balconies and used them as study or play area for children, and some have utilized the upper part of the balcony as a storage by adding sliding shelves Fig. 11.



Fig. 11. Utilizing upper part of balcony for more storage.

As a solution to improve the quality of spaces within the flat, some respondents have suggested to take off the partition between the corridor and the women reception area and, have a larger space to be used as a family living. Although this suggestion is difficult to implement, yet it shows the real need for a family living space. These conversions, additions and even the suggestions to demolish some partition show the degree of dissatisfaction of users with the type of flats they are living in. Further they reflect the discrepancies between the housing they have and the housing they feel that they should have.

The design and construction of a residential unit within a certain setting and specific climatic region requires a resolution of a number of problems which are the result of interaction of the social, economic, environmental and technological factors. Some would believe that housing problems can be solved through modern technology and organization alone if sufficient resources are available [26]. However, modern solutions involving new techniques will be beneficial if better understanding of the cultural norms of the users in a certain environment are considered. It seems that most of these variables, i.e. social, economic and environmental., were not given full attention regarding the flats under study. The thin uninsulated precast panel wall, floors and roof systems used, are not suitable for the climate of Riyadh. In Riyadh the ambient temperature are high in summer, between June and September, average maximum (43°C) absolute maximum (51°C); in winter, between October and February, average minimum temperature (8°C) absolute minimum (-1°C). The daily temperature range frequently exceeds (20°C) and because of clear skies, the level of radiation is very high [27].

In addition the cross-like shape layout of the four flats has led to have two flats in the wrong orientation. Because of these problems, i.e., wrong orientation, use of thin elements of construction, no provision of shading, etc; some respondents living in those flats (33%), have expressed dissatisfaction regarding the inefficiency of the A.C. and the high cost of the electricity bill they are paying as a result. According to a field study of the internal thermal environment of the flats [28], the recorded temperatures values reflected the influence of orientation on indoor climate. A difference of (2.4K) in the maximum indoor temperature and (2.3K) in the minimum indoor temperature was recorded between the best and worst orientations. This difference seems to be due to the fact that the structure of the envelope is composed of a very thin r.c. walls without the use of any thermal insulation and because of the wrong orientation.

Conclusion

The study has shown clearly that the design solution of the flats does not provide the type of spaces which respects the social and cultural backgrounds of the users. This is witnessed by the statistics shown in Table 2, where respondents from different countries have agreed that the design of the flats lack many spaces, function and values required by the occupants. Also it ignored the physical environment of the region.

Findings from this study call for a review of such design solutions, which were based on limited data. The lessons to be learned from this study may be summarized in the following:

1. The respondents are very critical of the central corridor because it divides and segregates the living spaces of the flats, restrict the family integration and acts as a source of environmental hazard.
2. The design of the existing flats does not sustain privacy. Most occupants use physical devices to obtain privacy. Such arrangements will conflict with the quality of the internal environment i.e., obstructing light, ventilation and social interaction.
3. Regarding the three types of flats, there is no balance between the area of the flat and number of rooms, compared with the number of persons per family. Moreover, all flats have two bathrooms regardless of the number of rooms or size of family.
4. Family space, study area and big storage space are needed.
5. The layout and orientation of the blocks coupled with use of thin uninsulated materials in the building fabric seem to have ignored the physical environment of the region.
6. The external spaces as they exist are not used by occupants because they are dull, not well landscaped and no provision made for the families.

Acknowledgement. The author wishes to express his gratitude and appreciation to the Vice President for Graduate Studies and Research and the Dean of the College of Architecture and Planning, King Saud University for their great help and assistance.

References

- [1] Davis, S. *The Form of Housing*. Reinhold: Van Nostrand, 1977.
- [2] Evans, G.W. "Design Implications of Spatial Research". In: Aiello J.R. and Baum, A., *Residential Crowding and Design*. New York: Plenum, 1979.
- [3] Soen, D. "Habitability-Occupants' Needs and Dwelling Satisfaction". *Ekistics* No. 275 (March, April, 1979), 129-134.
- [4] Mehrribian, A. "Public Places and Private Spaces, The Psychology of Work, Play and Living Environment". New York: Basic Book, 1976.
- [5] Talib, K. *Shelter in Saudi Arabia*. Academy Edition, 1984.
- [6] Huang, Ed. "Towards a Social Design of Housing in Saudi Arabia". In: Al Sayyad, N. "The Design and Planning Housing". *Proceeding of Seminar at College of Environmental Design*, Dhahran: Saudi Arabia, 1984.
- [7] Fadan, Y. *The Development of Contemporary Housing in Saudi Arabia (1950-1983), A Study in Cross-Cultural Influence Under Conditions of Rapid Change*, Ph.D. Thesis, MIT. (Unpublished), 1983.
- [8] Bahammam, A.S. *An Exploration of the Residents' Modification: Private - Sector Low Rise Contemporary Housing in Riyadh, Saudi Arabia*. Ph.D. Thesis, University of Michigan (unpublished), 1992.
- [9] Mofiti, F.A. *Urban Housing Design in the Context of Saudi Arabia's Cultural and Physical Conditions: Potentials and Constraints*, Ph.D. Rensselaer Polytechnic Institute (unpublished), 1981.
- [10] Al-Tassan, A.M. *An Analytic and Evaluation Study of Government Employee Housing Programs in Saudi Arabia: Using the Analytic Hierarchy Process*, (Vol. 1). Ph.D. Thesis, University of Michigan (unpublished), 1986.

- [11] Moge, J. and Morris, R. *An Analysis of Satisfaction*, (quoted by Dan Soen Ref. # 26), 1960.
- [12] Morris, E. and Winter, M. *Housing, Family and Society*. New York: John Wiley, 1978.
- [13] Rapoport, A. "Cross-Cultural Aspects of Environmental Design". In: *Altman, Rapoport and Wholwill, Human Behaviour and Environment*, Vol. 4, New York: Plenum Press, 1980.
- [14] Rossi, R. *Why Families Move, The Free Press of Glencoe*, (quoted by Dan Soen Ref. # 26), 1955.
- [15] Wilner, D., Walkley, R. and Cook, S. *Human Relations in Interracial Housing*. University of Minnesota Press (See Soen D. Ref. # 26), 1955.
- [16] Oates, W.E. "The Effects of Property Taxes and Local Public Spending on Property Taxes". *Journal of Political Economy*, 1969.
- [17] Zimring, C.M. and Reizenstein, J.E. "Post Occupancy Evaluation: An Overview". *Environment and Behavior* 12, No. 4 (1980), 429-450.
- Reiser, W.F.E., Rabinowitz, H.Z. and White, E.T. *Post Occupancy Evaluation (POE)*, New York: Van Nostrand Reinhold, 1988. [18]
- [19] Ranson, R. *Healthy Housing, a Practical Guide*, London: E & FN Spon, WHO, 1991.
- [20] Robertlym, G. *A Psychology of Building*, New Jersey: Prentice Hall, 1980.
- [21] Riemer, S. "Maladjustment to Family Home". *American Sociological Review*. 10, (1945), 642-48.
- [22] Baum, A. and Stuart, V. *Architecture and Social Behaviour, Psychological Studies of Social Density*, New Jersey: Lawrence Erlbaum, 1977.
- [23] Flemings, R., Baum, A. and Singer, J.E. *Social Support and the Physical Environment, Social Support and Health* Academic Press (Orlando FL.), 1985.
- [24] Levy-Leboyer, C. "The Need of Space and Residential Satisfaction". *Architecture and Behaviour*, 9, No. 4 (EPFL Lausanne), 1993, 475-489.
- [25] Abu-Gazzah, T. "Privacy as the Basis of Architectural Planning in the Islamic Culture of Saudi Arabia". *Architecture and Behavior*, 11, Nos. 3-4 (1995), (EPFL Lausanne), 269-287.
- [26] Grenell, P. "Planning for Invisible People, Some Consequences of Bureauratic Values and Practices". In: Turner, J. and Fischer, R. *Freedom to Building*. New York: Macmillan, 1972.
- [27] Idris, M. "Design and Detailing Considerations of Roofs in a Hot-Dry Climate: A Case of a Large Flat Roof". *Architectural Science Review*, 39, No. 4 (1996), 193-199.
- [28] Saeed, A.S. "Indoor Climate as a Function of Building Orientation". *Ambient Energy*. 8, No. 1 (1987), 41-47.

دراسة تقييمية لشقق الإسكان الجامعي في مدينة الرياض من واقع تجارب السكان المعيشية

محمود محمد إدريس
قسم العمارة وعلوم البناء، جامعة الملك سعود ،
الرياض ، المملكة العربية السعودية

(قدم البحث في ١٠/٥/١٤٢٠هـ؛ وقبل للنشر في ٩/١١/١٤٢٠هـ)

ملخص البحث. تطرح الورقة محاولة لتقويم نمط استخدام فراغات المعيشة في الشقق السكنية المصممة معيارياً وذلك بتحليل آراء السكان وخبرتهم في استخدام تلك الفراغات. وقد استخدم لهذا الغرض استبيان وزع على عينة عشوائية مختارة من الأسر التي تسكن في شقق الإسكان الجامعي - جامعة الملك سعود بالرياض. وقد أظهرت الدراسة الميدانية للعينة العشوائية المختارة أن معظم السكان يشكون من عدم تطابق الفراغات المعيشية والخدمية لعدد أفراد الأسرة وممارسة الأنشطة اليومية، هذا بجانب عدم توافر الخصوصية بالقدر الكافي وتدهور البيئة الداخلية للمسكن نفسه. وتكمن أهمية الدراسات الميدانية لما بعد الاستخدام لهذا النوع من الإسكان في توفير الكثير من المعلومات التي تساعد في إيجاد الموازنة بين المتطلبات الاقتصادية والتقنية من جهة وتوفير المتطلبات الإنسانية للسكان من جهة أخرى.