

# EXPLORING IMPORTANT FACTORS INFLUENCE DEMAND FOR FLEXIBLE WINDOWS: A QUANTITATIVE STUDY OF UNIVERSITI TEKNOLOGI MALAYSIA STAFF

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## Abstract

*The current trend in mass produced housing in Malaysia includes the provision of housing unit which are not easily adaptable to the lifestyle changes of users. Consequently, various architectural elements of housing units including windows are subject to modification. This phenomenon is evident when 42% of the respondents of this research experienced window replacement in their homes. This study has been undertaken with particular focus on users' reasons for having flexible windows. To achieve this, quantitative surveys were carried out among staff members of Universiti Teknologi Malaysia. The results indicate 74.4% of the users, spread among various social groups, are enthusiastic about having flexible windows installed in their houses. Consideration of this demand for flexible windows reveals that personalized housing and the various levels of environmental comfort shows parallelism. Flexible windows are in demand to fulfil physical and psychological housing needs. By linking the user's needs to flexible windows, user-congruence environment, hence propagation of sustainable living environment will be improved.*

**Keywords:** Housing, flexible windows, demand for flexible windows, survey.

## 1. Introduction

Conventional wisdom and scientific research have long supported the premise that windows are a major factor in ensuring occupant health and well-being (Farley & Veitch, 2001). The role of this predictor of housing satisfaction (Onibokun, 1974) is more than just that of a provider of natural lighting, sunlight, natural ventilation and view.

Flexible built environment theories have evolved steadily from the "1920s Modernity and the minimal dwelling", to the "1930s-1960s Industrialization of housing" until it reached "The importance of Participation and user choice" in the 1970s (Schneider & Till, 2007). There are abundant definitions of flexible housing as provided by several authors. Studying a large body of literature demonstrates that flexibility in architecture is an approach that provides multiple solutions against tight-fit functionalism and layout for facilitating housing personalization. The role of flexibility for better housing personalization gained significant importance when Vischer (2008) maintained that human behavior is influenced by features of inhabited spaces both large and small. Such a phenomenon makes users central to home making. However, the process of mass housing production these days displays a reckless disregard of end user participation (Israel, 2003; Oliver, 2006; E. O. h. Omar, E. Endut, & M. Saruwono, 2012; Rodriguez Machado, 2004).

An abundance of window preferences among users (Lau et al., 2006) along with the phenomenon of designer-user gap and time have had repercussions on the modification of various architectural elements including windows within Malaysia (Jusan, 2007; E. O. Omar,

E. Endut, & M. Saruwono, 2012; E. O. h. Omar, et al., 2012; Rahim & Hashim, 2012; Saji, 2012). In fact, such a phenomenon makes Jusan (2010, p. 94) conclude that:

*“A flexible design that facilitates easy changing of doors and windows (fenestration) must be developed.”*

The inherent problems of windows make the invention necessary. While the evolution of windows as they became integrated with the cover of the structure was a development that made the construction industry more industrialized, significant challenges emerged. A serious weakness with integrated units arose from the removal and replacement process that affected the area between the window frame and the integrated area. This method not only resulted in increased demolition waste, damaged windows components, a decline in reusability, and increased cost, but it also decreased the life cycle cost of the current method of windows replacement (Katsaros & Hardman, 2007). Flexible windows is a coping strategy not only for encouraging user participation but also for ensuring quality products that are economically and fully sustainability. Moghimi & Jusan, (2013) defined flexible windows as a building component which is designed based on principles of design for disassembly for choice at the design stage or designed for change over its lifetime.

In fact, insufficient flexibility among current building components (Baldwin & Tomita, 2007; Deller, King County, Price, & Kahley, n.d.; Hanser, 2003; Jusan, 2010; Richard, 2006; Sadafi, Zain, & Jamil, 2011; Zavei & Jusan, 2012) including windows (Hurley, 2003; Jusan, 2010; Katsaros & Hardman, 2007) not only brings forward several economic disadvantages but also environmental and social disadvantages as well.

Despite the available research regarding tracking the degree and roots of housing personalization within Malaysia, far too little attention has been paid to occupants' enthusiasm to demand flexible windows. Notwithstanding the clear advantages of flexibility, the successful adoption of flexible windows has not occurred. The following research objective has been formulated to promote our understanding of:

- i. Establishing the level of user interest in the need for flexible windows.
- ii. Exploring the factors that lead to the importance of flexible windows.

The purpose of this paper is to first study the enthusiasm for having flexible windows within dwellings and then to identify the reasons behind the demand for flexible windows.

## **2. Theoretical framework**

### **2.1 Malaysia and housing personalization**

It was under the Seventh (1996-2000) and Eight Malaysia Plan (2001- 2005) that the Malaysian government made the commitment to make available adequate and affordable housing through mass housing development for all Malaysians, with a main focus on low income groups. The country went through a stage of constructing large, inflexible housing developments with little or no user input. Clearly, this development was not exactly what the residents sought. Despite the economic advantages of mass housing development, speculative design through assumption cannot respond to the diversity of needs as well as preferences. Its advantages bring forward serious disadvantages. That one design should fit all individuals is illogical (Cooper, 1975; E. O. Omar, et al., 2012).

A suitable living environment can be created while user's preferences are met (Rapoport, 2000) and when occupants are offered the possibility of housing

personalization through flexible approaches (Jusan, 2010). Otherwise, dissatisfaction due to mismatches between housing design and user needs as well as preferences may emerge. Consequently, increasing the tendency to adapt or modify to suit their needs is plausible (Ozaki, 2002). The scenario of housing renovation and modification is experienced as a coping response against inadequate houses.

One major theoretical issue that has dominated the necessity for flexibility within Malaysia originates from the remarkable level of housing personalization which has been exerted for the purpose of solving the inadequacy of homes. A house will be a home only if it has been personalized by its occupants (Jusan, 2007, 2010; E. O. Omar, et al., 2012).

Window replacement is a part of housing alteration and personalization (Jusan, 2007; E. O. h. Omar, et al., 2012). Several studies investigating housing personalization within Malaysia have identified windows as a renovated building component (Jusan, 2007, 2010; E. O. Omar, et al., 2012; E. O. h. Omar, et al., 2012; Rahim & Hashim, 2012; Saji, 2012).

## **2.2 Needs for Windows Replacement**

Usually, in time identification of problems within existing windows necessitates the adoption of a new system or product. Time is referred to as the fourth dimension in building, and entails change and usually degradation of performance, usability, occupant satisfaction and the life cycle costs of built facilities (Thomsen & van der Flier, 2011). Windows are renovated and modified both intentionally and unintentionally. Intentional modifications arises due to several factors, such as the windows physical condition including defects energy costs, air ingress, poor sound insulation, and difficulty in keeping windows clean (Nair, Mahapatra, & Gustavsson, 2012). Other reasons include changing the window design, manipulating the number of windows within specific areas, use as enlargement tools, and changing windows for esthetic purposes. However, in several cases, physical modification or space relocation has an incidental impact on interconnected wall components such as windows (Jusan, 2007; E. O. Omar, et al., 2012; E. O. h. Omar, et al., 2012; Rahim & Hashim, 2012; Saji, 2012).

The above evidence suggests that windows are renovated to fulfill physical and psychological needs. On the other hand, dwellings are personalized to fulfill physical, psychological, and social needs (Jusan, 2010). Generally, houses within Malaysia are personalized to fulfill:

- i. Physical, Functional and Use benefits  
Everyday activities, better functioning, better facilities, economic gain, future modification, physical improvement, maintenance, etc.
- ii. Psychological Needs  
Personal well-being (Pleasant feelings, security, user preferred aesthetic).  
Personal identity (Personal Images, Self-reflection).
- iii. Social Relation (Communal activities).

## **2.3 Context of comfort in the context of windows**

A psychological concept rich in cultural, demographical and psychological values makes a house more than a habitable physical structure composed of building components. A home is responsible for providing a sense of warmth and comfort, safety and security to the occupants and at the same time, through the process of

personalization, residents have the opportunity to express their identity to others (Jusan, 2010). In fact, each building component plays a critical role in the overall performance of this complex and heterogeneous product. Windows are a provider of comfort within an inner space. However, any failure to attain expected physical, functional and psychological needs results in decreasing that level of comfort. Demonstrating the idea of comfort through Vischer (2007), “Habitability pyramid” illustrates the relationships between environmental comforts ranging from discomfort, physical comfort, functional comfort and finally psychological comfort, concepts which are useful in the context of this paper (See Figure 1). Comfort is associated with safety as well as health, functional environment and also the psychological aspects for the users. Thus, this concept can reasonably be related to the windows within the home environment.

The base of this pyramid is structured by physical comfort which covers basic human needs which are necessary for a home to be habitable. In fact, windows must be in a state which supports a suitable living environment. This is achievable via responsible design, adherence to guidelines and regulations as prepared by authoritative bodies, and ensuring the health and safety of the occupants. Windows which do not provide these minimum standards may contribute to discomfort and in the long run generate stress and dissatisfaction among the occupants. The next level consists of functional comfort and is focused on effective-performance. At the top of the pyramid is psychological comfort which involves several issues such as territorial boundaries, privacy, perception, social interaction, personal meaning and control of the occupants. By achieving the highest level of comfort, occupants get closer to true satisfaction. However, functional and psychological comfort depends on individual requirements.

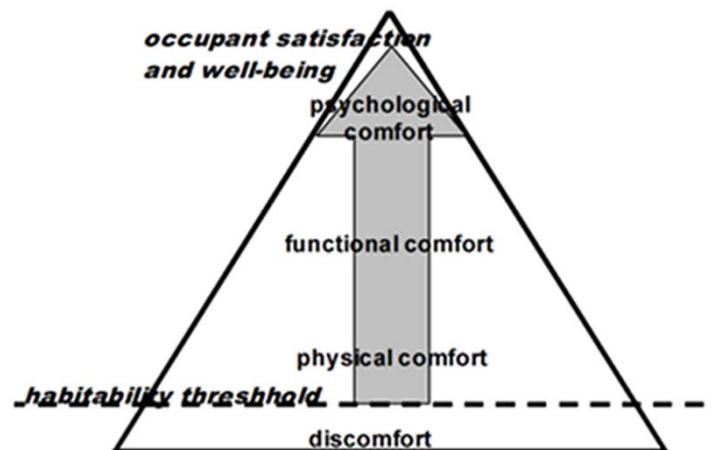


Figure 1. Habitability Pyramid showing relationship of environmental comfort.  
Source: Vischer (2007)

### 3. Methodology

This study investigates the users' intention to have flexible windows. This area of study was selected based upon the richness of information about replacement windows and their contribution to housing personalization.

#### 3.1 Subjects

Recruiting ordinary users inhabited near the UTM campus and conducting the study using English as the means of communication faced the respondents with difficulties

to be involved and express their needs. These difficulties hindered the study's progress. Therefore, in order to cope the language barriers, UTM staff composed of various socio classes of the society took ordinary users' place. In order to find the appropriate sample size, considering faculty staff population in the sample size formula resulted in 182 respondents composed of 114 academic and 68 non-academic staff members.

### 3.2 Material

As the applied instrument for this research, a questionnaire survey was designed to study the reasons behind users' demands for flexible windows. It was decided that the best way to begin this investigation was to gather data based on the distribution of an open ended questionnaire survey as open ended responses make it possible for respondents to better express their opinions. The most repeated responses were then codified and structured as the body of close ended-responses of the survey. Questionnaire survey was classified into studying (a) Respondents characteristics (b) Background of house windows replacement (c) and reasons for demanding flexible windows. The survey results for close-ended questions were transferred to the Statistical package for the Social Sciences (SPSS) environment and will be analysed by frequency and cross tabulation distributions of the variables.

Table 1 shows the gender composition of respondents with females representing 53.3% and males 46.7% of the total distribution. Also, the proportion of married to single respondents is 48.6% and 51.4% respectively. Age distribution shows that age groups 20-30 years, 31-40 years, 41-50 years and 51-60 years have corresponding scores of 51.1%, 22.0%, 21.4%, and 5.5% respectively. Age 60 and above were conspicuously absent among respondents. Respondents income classification is broken into five broad groups through the adoption of Shuid (2004) classification as follows: the high income group earning more than 6000 RM (30.0%), upper medium income group between 4001 RM to 6000 RM (32.4%), lower medium income group 2501 RM to 4000 RM (10.0%), medium low income group between 1500 RM to 2500 RM (25.9%), and finally, 1.8% of the population earned less than 1500 RM which can be called low income.

Table 1. Summarized Demographic/Housing Characteristic Frequencies

Demographic Items	Frequency	Percentage(%)
<b>Gender</b>		
Male	85	46.7
Female	97	53.3
Total	182	100
<b>Marital status</b>		
Married	88	48.6
Single	93	51.4
Total	182	100
<b>Age</b>		
20-30	93	51.1
31-40	40	22.0
41-50	39	21.4
51-60	10	5.5
Over 60	-	-
Total	182	100
<b>Household Monthly Income</b>		

Less than 1500RM	3	1.8
Between 1500 to 2500 RM	44	25.9
Between 2501 RM to 4000 RM	17	10
Between 4001 RM to 6000 RM	55	32.4
More than 6000 RM	51	30
Total	182	100

### 3.3 Procedure

The initial questionnaire was pre-tested using a pre-sample of approximately 25 UTM staff. Some items were then reworded to improve validity and clarity. Data for the main study was collected through the application of a self-administered questionnaire survey.

## 4. Results and Discussions

### 4.1 Flexible Windows and Housing Satisfaction

Studying the users' enthusiasm to adopt flexible windows in their present houses and enhancing their housing satisfaction demonstrates that 69.0 % of the population believed that enhancing their housing satisfaction level by adopting the use of flexible windows is likely. In addition, feedback from respondents also indicated that when the choice of window and expected functional requirements match their expectations, the level of housing satisfaction is positively impacted. With flexible windows users have options and opportunities to make choices in respect of the capacity of the living environment. Since flexible approaches in housing design has been identified as major contributing factors for achieving residential satisfaction in mass housing development (Altaş & Özsoy, 1998) and while windows have been studied as a predictor of residential satisfaction, appropriate use of windows based upon end-users' wishes may help to support residential satisfaction in mass housing developments.

### 4.2 Users and Windows Replacement

The data collected and analyzed shows that 42% of the respondents have changed or replaced window units in their dwellings at one time or another. According to Figure 2, overall, medium and low cost houses had been through the motions of window replacement at a significantly higher rate than high cost houses. It is plausible to conclude that there is a preponderance of housing modification among the low and medium cost houses and this submission is consistent with the findings of Carmon (2002) in a study carried out in Israel. Although the level of window replacement within low cost houses was significant, in this context there was a huge gap between low and medium cost houses.

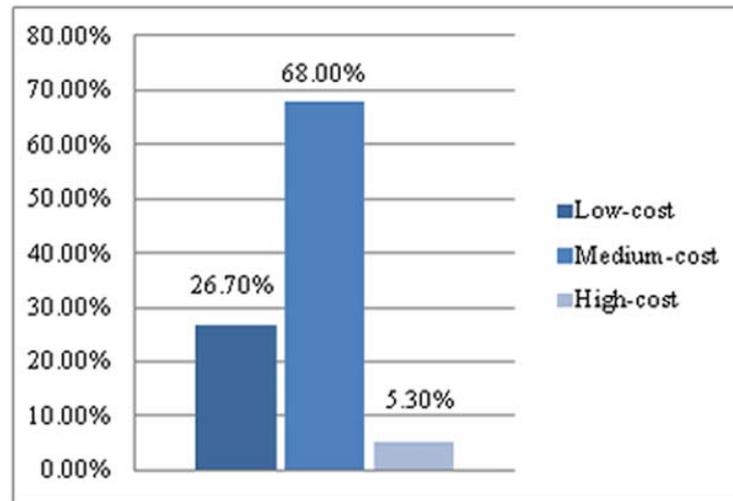


Figure 2. Experience of window replacement

The architectural designs of a large number of low cost houses are not without shortcomings. There are remarkable gaps between the design and the needs of the occupants. A modification is needed to make up for these gaps. However, many of the low cost users are financially incapable of making such modifications. One of the major reasons advanced by the low cost users for their inability to modify or personalize their dwellings is the problem of inadequate finance to successfully replace their windows. Availability of a direct relationship between exerted window replacement and level of income is justifiable through Fig. 3. Drawing a line running through low income to upper medium income yields a rising curve which reaches its optimum at upper medium income and before turning down at high income (See Figure 3).

It is difficult to explain such a trend but most probably it is rooted in the users' financial level and congruence of homes to occupants wishes. Although the majority of the first two groups live in low and medium-cost houses with higher levels of inappropriateness, financial incapability is a serious obstacle to the replacement of windows. However, reaching the lower medium income group 2501 to 4000 RM and the upper medium income group 4001 to 6000 RM represents a significant level. In fact, problems with low and medium-cost houses and higher level of financial capability lead to such a great trend toward window replacement. On the other hand, despite lack of financial problems, the high income group has experienced window replacement less often compared to the upper medium income group and lower medium income group. It may be that the high income group benefited from their congruent homes from the initial design stage and as a result, are less motivated to replace their windows.

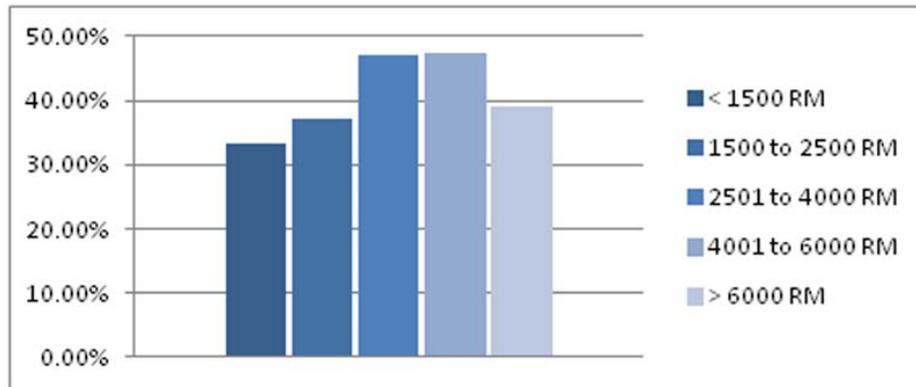


Figure 3. Level of respondents' income and window replacement experience

Identifying finance as an important factor in determining window replacement and housing modification and personalization by Malaysians showed a kind of consistency with Onder and Der (2007) who reported most of the obstacles influencing housing modification among the Turks arise from the incapacity of households to compensate for the deficiencies due to lack of finances. This affirms a direct correlation between undertaking window replacement and financial capability. However, there are several studies which suggest the benefits of flexibility from the economic perspective (Fawcett, Hughes, Krieg, Albrecht, & Vennström, 2012; Hanser, 2003; Jusan, 2010). There can be no doubt that solving financial problems through offering flexible windows result in increasing the level of window replacement among these groups. This will not only give them financial relief but it will also give them a voice in speaking their own architectural language and the experience of living in a user-congruent home.

Window replacements within the context of Malaysians' houses can be attributed to a variety of reasons. The dominant forces which motivate this effort not only enhance appearance and functionality, but also have a large impact on the fulfillment of physiological and psychological needs. Table 2 has been assigned to represent the reasons for window replacement. As shown in the table, the most highlighted reason for window replacement is housing modification and relocation of space (24.2%). This was followed by window physical condition defect (14.8%) and aesthetical aspects (11.0%). However, the other reasons cited are not significant and a small number of people changed their properties windows because of ventilation problems (8.2%), energy cost (8.2%), reflecting personal or group identity (6.6%) and joy of emerging new product (5.5%). Reasons for window replacement can be the major contributing factor for the need to develop flexible building windows in current mass housing developments.

Table 2. Reasons for window replacement

Reasons for Window Replacement	Frequency (N)	Percentage (%)
Housing modification and relocation of space	44	24.2
Physical condition defect	27	14.8
Look nicer (Aesthetic)	20	11.0
Adequate ventilation	15	8.2
Energy cost	15	8.2
To reflect personal or group identity	12	6.6
Emerging new product	10	5.5
Other	-	-

### 4.3 Demand for Flexible Windows

74.4% of total respondents would like to enjoy the use of flexible windows in their dwellings. However, the desire for flexible windows is shown by all social groups. The desire to adopt flexible windows depends neither on users' income level or type of dwelling. In fact, this desire is a universal concern. On the other hand, the enthusiasm to adopt flexible windows is much more significant among non-academic staff. It can be interpreted that two main factors influence users to demand this product namely, financial motivation and nonconcurrency of affordable architectural elements with users' housing expectations.

Figure 4 illustrates that medium low income group (1500 to 2500 RM), high income group (more than 6000 RM) and the low income group (less than 1500 RM) have expressed a remarkable desire for flexible windows. Surprisingly, these groups have experienced window replacement less than upper medium income (4001 RM to 6000 RM) and lower medium income group (2501 RM to 4000 RM). Such a level of interest among all social groups is explainable from various aspects. First, the positive attitude exhibited by the two groups (2501 to 4000 RM and 4001 to 6000 RM) towards window replacement may have been shaped by the benefits they enjoyed in the past from house modification and personalization. Second, on the other hand, those groups (less than 1500 RM, 1500 to 2500 RM and more than 6000 RM) who have less experience with window replacement showed more interest to install flexible windows and to enjoy the advantages of window replacement.

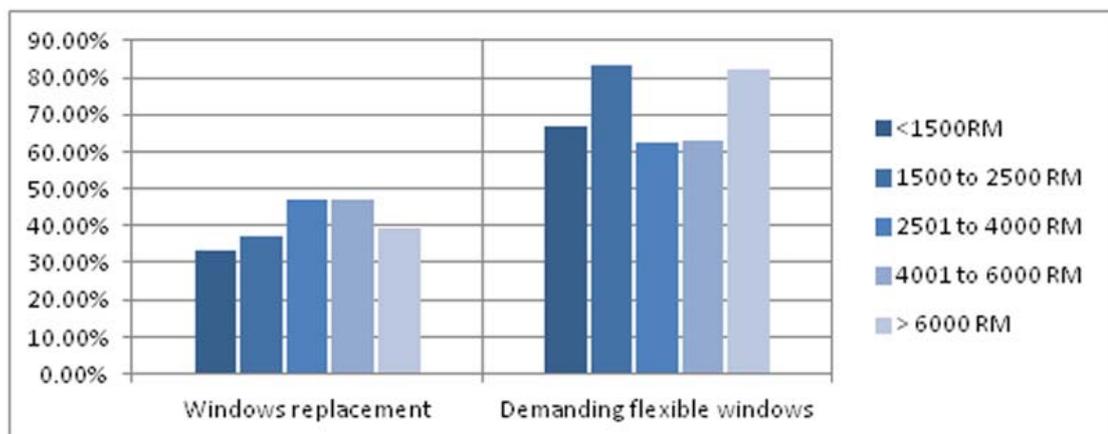


Figure 4. Window replacement versus demand for flexible windows

#### 4.3.1 Flexible Window Needs

##### *Physical*

The result within Table 3 shows that “facilitating future housing modification” was the main and second most frequent reason of having flexible windows. In fact, such a result is supported as housing modification and relocation of the space are the reasons most highlighted for window replacement in this research. In this regard, several surveys carried out within Malaysia show that spatial extension, relocation and transformation of the space affected windows and result in window replacement (Jusan, 2007; E. O. h. Omar, et al., 2012). In addition to the above needs, accommodating strategies for some sort of further modification leads to increases in occupant satisfaction and people were satisfied with buildings over which they had a degree of control (Onder & Der, 2007). This concept can be extended to the installation of flexible windows within houses. In fact, the emergence of new spatial needs of parallel importance with the issue of user-controlled environment lends credence to the importance of the need for flexible interconnected wall components such as windows.

The other serious reason behind the demand for flexible windows is that of functionality and benefit of use. Economic gain and saving money (57.7%) is of large significance. To justify the economic benefits of flexible windows, a flexible strategy of economic prosperity has been maintained and proven better than either of the non-flexible strategies (Deller, et al., n.d.; Fawcett, et al., 2012; Hanser, 2003; Jusan, 2010; Onder & Der, 2007). This is explainable thorough eliminating the difficulty of destructive removal and replacement process via applying assembling and disassembling strategies which makes replacement of flexible windows possible with less time, energy and expense. In this regard, the economic efficiency of flexible building products has been proven in an experimental study by Hanser (2003). It was proven that the cost of reconstructing a flexible wall was almost one fifth the cost of a conventional wall partition which needs to be demolished and then rebuilt.

Ease of maintenance (48.9%) as well as ease of repair were sought. Supportability and usability features have been seen in respect to maintaining, repairing, cleaning and then changeability. Demand for these features is intended to increase the level of functional comfort within a living environment. The present findings seem to be supported by Korkut et al. (2010) who found that easy cleaning, maintaining, repairing as well as changing of windows are the expressed characteristics of window preferences, encountered problems and proposed recommendations of window improvements in Turkey. Any failure in fulfilment of those aforesaid reasons could generate discomfort and stress.

##### *Psychological*

Personal well-being and personal identity are underlying psychological needs. Within this level as it is apparent from Table 3 that 46.7% of the users show enthusiasm to adopt flexible windows in order to create a new environment. It seems that new windows offer 39.6% of the users a more aesthetic atmosphere. Moreover, utilizing a variety of designs (30.8%), stimulate better feelings within their living environment (30.2%). A more comfortable living environment (26.9%) and a better expression of group identity (25%) are the other reasons. In addition, flexible windows have been sought by 18.1% of the respondents to promote possibility of adaptability and make an adaptable size of opening feasible. Adaptability and

flexibility are complementary. Exerting adaptable size of openings for different periods of time during a day was demanded to help users enjoy a higher level of privacy within their dwellings. Other responses within this category of needs included safety of the process (15.9%), preventing a tedious appearance as well as atmosphere (11.5%) and keeping a dwellings window products up-to-date (8.8%).

Based on statistical analysis of this survey, there is great enthusiasm to create a new and more aesthetic atmosphere by applying flexible windows (See Table 3). Such a large demand is likely connected to the aesthetical shortcomings of affordable housing windows. A longitudinal study of housing satisfaction and preferences by Liu (1999) and Opoku and Abdul-Muhmin (2010) reports that aesthetic is one of the reasons of housing satisfaction and preferences. Windows are one of the facade components which influence the level of attractiveness of the interior and exterior environment. In addition, aesthetic has been listed as one of the psychological determinants in the planning of interior environment in order to satisfy the occupants' psychological needs and concerns. On the other hand, mass production of affordable houses has brought to the fore the inability of houses to meet the design expectations of users in terms of aesthetics and psychological needs. Although affordable mass housing neglects the importance of interior environment, there is abundant literature that illustrate the influential relationship between the residential interior and occupants' physical and psychological health (Carney, n.d.).

Maslow's hierarchy of needs is composed of psychological, safety, belonging, esteem, and self actualization (Zavei & Jusan, 2012). Since safety of dwellings within this hierarchy consists of a safe environment, security of body, resources, morality, family health and property, the safety of the process of maintenance, repairs and window replacement are given a prominent significance.

A house is the most likely physical setting to be modified when it is inconsistent or incongruent with the needs, expected behavioral patterns, the activity system, privacy and social interaction of the family. Marcus & Sarkissian (1986) cited in Omar *et al.* (2012) discuss added privacy as one of the components of a design guideline in encouraging housing personalization. Studying the adaptation to terrace houses within Malaysia conducted by Rahim and Hashim (2012) indicates that in most cases, behavioral adaption was required to provide privacy at both public and private levels. At the public level, behavioral adaptation was needed to achieve visual privacy; both inside and outside the house when observation was effective, and to limit unwanted social interaction. Flexible windows, by providing possibilities of adaptability, have been demanded rather than behavioral adaption. Privacy is a communal concern and occurs in all cultures. In fact, the joy of changeable climatic conditions within different periods of a day, and additional house privacy by limiting the field of view from the outside in Malaysian culture would make the residents much more satisfied.

Table 3. Categories and Expected Consequences

Level	Category	Consequences	Count	%	
Physical	Physical improvement	Facilitating future housing modification	103	56.6	
		Functional and use benefits			
	i)Economic Gain	Save money	105	57.7	
	ii)Supportability	Ease of maintenance	89	48.9	
Psychological	Personal well-being	Easy to change	45	24.7	
		Creating new environment	Ameliorate the level of comfort	49	26.9
			Creating new environment	85	46.7
		Enhance the living environment aesthetic	72	39.6	
		Utilizing a variety of designs	56	30.8	
		Arouse better feelings	55	30.2	
		Privacy	53	29.1	
		Improve health and safety of the process	29	15.9	
		Preventing tedious appearance and atmosphere	21	11.5	
		Keep my dwellings window products up-to-date	16	8.8	
	Personal identity/ Reflection of oneself				

## 5. Conclusion

This study has identified the main reasons driving the demand for flexible windows among Malaysians. The purpose of the current study was to determine why Malaysians would like to adopt flexible windows within their dwellings. The result of the investigation shows that enthusiasm to adopt flexible windows and make a positive impact on occupant housing satisfaction is a universal concern and depends neither on level of income nor type of dwelling. Moreover, evidence in support of the demand for flexible windows, housing personalization and environmental comfort are parallel to some extent. In short, according to these findings peoples' demands and needs are derived mainly from psychological and functional use benefits. Taken together, economic gain through saving money, facilitating housing modification, ease of maintenance, creating new environment and increasing the aesthetics accounted for the largest level of significance.

Flexible windows can facilitate a greater control through an acceptable level of comfort within the living environment. Similarly, it offers users options and opportunities to make choices in respect of the capacity of the living environment to support their biological and physiological needs. Since window preferences are influenced by various social and cultural factors, satisfying different cultural styles, preferences and needs within a multiracial country like Malaysia is a major challenge. However, through a democratic procedure, flexible

windows fulfill user psychological needs in terms of contributing to the enrichment of cultural and aesthetical values in a variety of aspects. Everybody prefers a user-controlled living environment. This not only has a positive influence on the enhancement of housing satisfaction and pleasant feelings, but also on promoting a user-congruent environment, minimizing failure of housing design, and the plausibility of providing good housing. It is our opinion that there is great research potential in the area of investigating reasons for demanding flexible building components. Most of the conducted researches have focused more on tracking housing personalization and modification or housing preferences. However, a noticeable amount of research needs to be done in the area of demanding flexible building components and user expectations of those components as a required tool in the propagation and promotion of sustainable living with positive implications on family life.

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