COLOR PREFERENCE IN INTERIORS: A CASE STUDY IN ANKARA

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ABSTRACT

COLOR PREFERENCE IN INTERIOR DESIGN : A CASE STUDY IN RESIDENTIAL BUILDINGS IN ANKARA

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As one of the most important elements in design and architecture, color is influential on the way space users perceive the interior and feel in it. Furthermore, in the literature there is evidence that color has more than an aesthetic effect by having psychological effects that subsequently affect the comfort and positivity of the people in a certain interior space. Several studies argue that the choice of color in the interior space is correlated to personal factors such as personality, gender, age and culture. However, other reviews and studies deny the link between the two parameters. In this research, a subjective methodology using a questionnaire involving 161 participants from two different cultural backgrounds; Libyan and Turkish, was utilized in order to test any difference for choice of color for interior residential spaces. Testing the hypotheses established on correlations between the color choice of interior residential spaces with the gender and cultural background factors, the results of the study show that there is no significant difference between the choice of both groups in both cases at a confidence level of $p < 0.05$.

Keywords: residential, color preference, gender, cultural background

ÖZ

İÇ TASARIMDA RENK TERCİHİ: ANKARA'DAKİ KONUT BİNALARINDA BİR VAKA ÇALIŞMASI

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Kasım 2017, 90 sayfa

Tasarım ve mimaride en önemli unsurlardan biri olan renk, alan kullanıcısının iç mekanı algılama ve içinde hissetme biçimini etkilemektedir. Ayrıca, literatürde, renklerin tasarım etkisini belirli bir iç mekan alanındaki insanların konforunu ve pozitifliğini etkileyen psikolojik etkilerden geçtiğine dair kanıtlar bulunmaktadır. Birçok çalışma, iç mekan renk seçiminin kişilik, cinsiyet, yaş ve kültür gibi kişisel faktörlerle ilişkili olduğunu ileri sürmektedir. Bununla birlikte, diğer incelemeler ve çalışmalar iki parametrenin arasındaki bağlantıyı inkar ederek etmektedirler. Bu araştırmada, Libyalı ve Türklerden olusan iki farklı kültürel geçmişten gelen 161 katılmcıya bir anket uypulanarak öznel bir metodoloji kullanılmıştır, iç mekan yerleşim alanları için renk seçimi için herhangi bir fark test edildi. İç yerleşim alanlarının renk seçimi ile cinsiyet ve kültürel arka plan faktörleri arasındaki korelasyonlar üzerine kurulan hipotezleri test eden çalışmanın sonuçları, her iki grupta da $p < 0.05$ güven düzeyinde seçim arasında anlamlı bir fark olmadığını göstermektedir.

Anahtar kelimeler: konut, renk tercihi, cinsiyet, kültürel arka plan

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1. INTRODUCTION

In the day-to-day life of the people who enjoy different colors through their vision, the color appears as natural characteristics of the world that can be sensed. The sensations caused by the color are normally considered for granted and the complex nature of sensation of the color is not apparent instantly. Comprehending the sensation of the color is not easy because it may be attributed to different frameworks, including unvarying stimulus qualities, preference scale which is being found in the people, and biological factors involved in this regard. Different people may respond to different colors due to cultural and social factors. The colors may be specified precisely through their brightness, saturation, and hue (Kuehni, 2012). These three characteristics of color are enough for the purpose of distinguishing a color from the colors which can be perceived other than that one. The term hue is associated aspects of the colors with the names given to these colors like yellow, blue, red etc. Saturation can be explained as the purity of one color relative to the other colors. When a strong, vivid and pure shades of red color is being amalgamated with any shade of the gray, paler or weaker shades of red will be made. Each of the newly produced red colors will have different saturations but same hue (Miller, 1997). The level of sensation of each color can be variant with a variation in three attributes of the colors as mentioned above.

Color doesn't only have the power to make things look colorful and attention engrossing, but it has the power to express emotions and feelings, and this perspective was discovered by Van Gogh and before him Paul Gaugin explained it. Both of these people managed the space and the color as a medium to express emotions, the colors are also being used by the artists but these uses are not through only observing things, but these colors exist in imagination and can be expressed objectively and subjectively (Wong, 2009).

1.1.   Research Gap

Although color and its use in interior design by the designer is not a new topic and has been discussed and explained by a number of researchers in their studies and on a number of platforms as its significance in architectural design cannot be negated. Some of the studies have explored the factors influencing this decision, but each study could only focus on one or two factors while it is demonstrated fact that all the factors are interlinked. In addition, many research work has been carried out to explore the preferences of colors in people for different commercial purposes; however, only a neglectable number of studies have focused on color preferences in the interior design of houses. As this is a neglected area of study, this study will bridge this gap in the literature by considering academic as well as the professional significance of the study. As this study has a main focus on case of residential buildings in Ankara, so it will provide the designers with guidance for the colors that are best fit for the different spaces within a residential unit.

1.2.   Aims and Objectives of the Study

The aim of the study is to concentrate on the preferences of color in the interior design of residential buildings especially in the city of Ankara, Turkey. The study is aimed at bridging the gap in the current literature and providing designers with an appropriate research on factors which may influence the color preferences in living rooms, bedrooms, kitchens and bathrooms of the residential buildings. The study will provide a strong research for the designers and future researchers in exploring the factors influencing the color preferences including age, gender, and personality of the person, educational background, and cultural background. Various objectives of the study have been structured based on the main aim of the research, which are given below:

- To determine the significance and impact of the cultural background of a person on his/her preferences for the colors in the interior design of his/her residential building's rooms.

- To ascertain the impact and significance of a person's gender on his/her preferences for the colors in the interior design of his/her residential building's rooms.

1.3.   Research Problem and Questions

The main problem that this research is addressing is understanding the favorite colors chosen for the essential elements of the residential unit; living room, bedroom, kitchen and bathroom. Moreover, the research studies the color choices in conjunction with the emotional reaction to each color assigned to a space, while correlating the gender and culture to the color choices. The research questions for this study has been formulated by combining all the major factors affecting color preferences. The hypothesis will be formulated on the basis of these research questions for which these variables are chosen. These three research questions are given below:

- What is the degree of influence of gender on the preferences for the colors in the interior design of residential building's rooms?
- What is the influence of cultural background of a person on the preferences for the colors in the interior design of the residential building's rooms?
- What are the most preferred colors for the basic spaces of the residential unit; i.e. living room, bedroom, kitchen and bathroom?

1.4.   Structure of the Study

This thesis is comprised of five chapters including an introduction, literature review, methodology of the research, data analysis and conclusion and discussion as shown in the figure given below.

This is the first chapter of the study and aimed at provision of all necessary conceptual information regarding the topic of discussion that is color preferences in interior design by the people specifically in the case of Ankara. It defines colors, discusses the background of the study, preference of the color by the people, and a

brief introduction of the factors influencing color preferences of the people, aims, and objectives of this study and finally the research questions formulated to be answered to conclude this research study.

The main objective of the second chapter of this study that is literature review is establishing the key concepts specifically related to the variables of the study which have been studied and researched by the authors in their studies. This chapter will include the definitions of all concepts, explaining the theories related to color preferences of the people for the interior design of their houses and accumulating and analyzing the literature regarding age, gender, personality of a person, social status, educational background and cultural background of the person as factors influencing these preferences.

Methodology is the third chapter of this dissertation in which a clear and detailed explanation of the methodology that is used by the researcher for completing this study is provided. This depiction will provide the development of a conceptual framework of the dissertation, formulation of a hypothesis, research philosophy, time-frame, techniques and tools of research, ethical consideration, and limitation of research and method of collection of data etc. for the dissertation.

This is the fourth chapter of the dissertation. After the collection of data through the questionnaire, this chapter will be based on the empirical investigation of the data has been given, including descriptive analysis including charts and graphs, correlation analysis between different variables.

This is the last chapter of the study, including crux of the study, including the conclusion of the literature reviewed and implication of reviewing literature for results of research in order to prove the previous theories or make new theories. In addition, a few suggestions for future research prospects has been given for future researchers on this topic.

2. COLOR

The literature review chapter is based on reviewing the conclusions and findings of the literature that was conducted by different authors in past on specifically the topic of color preferences of people in the interior design of their residential buildings. This chapter will elucidate the core concepts of colors, its use in interior design processes and factors which may or may not impact these preferences in the theories found in the literature. Colors and use of color is not a novice topic of research; however, the specific focus of the research on exploring the factors and more particularly on color preferences for residential buildings can be called as a newer concept which needs due focus of researchers, especially the interior designers for aiding them in their professional lives. The chapter will give an introduction to color and review the literature previously held regarding factors influencing preferences of the people including age, social status, cultural background, educational background, and gender of the person being studied.

2.1. Definition of Color and its Nature

One very important factor to the man-made environment is color; which has a strong effect on psychological and physiological well-being (Kalia, 2013). As they described the importance of colors, Meervein, Rodeck & Mahnke (2007), defined colors as "a specific visual sensation produced by visual radiation, or color stimulus that occurs when light from a natural or artificial source is interrupted by an object or a dust particle" (Page 4). More appropriately and in the wide perspective Dalke. et al (2005), defined color as "property of all surfaces and materials which include paint and light to art and as an inseparable element of design". According to sensation, colors have three qualities such as brightness which includes value and lightness, hue, and saturation which includes purity and chroma. These qualities are named as

dimensions of colors and they can be measured independently (Munsell, 1988; Fehrman and Fehrman, 2000).

Hue quality is described by the chromatic nature of color. For differentiation in colors, this quality is important. Gray, white and black are color without hue (Kaya et al, 2004). The brightness of color allows differentiating the light color from dark color (Fehrman & Fehrman, 2000). Brightness is the most important quality of the colors. The value of color is also known as shades. Saturation is the vividness of hue. It depends on the amount of pigment in the color (Fehrman & Fehrman, 2000. For decreasing the saturation of a color, white color is added to it and black color is added to decrease the brightness of a color and produced shades of color (Raskin, 1986). Color order system is designed to differentiate colors from each other because the human eye can classify the colors into ten million different colors (Fehrman & Fehrman, 2000). Munsell system includes ten main hues which are represented in Figure 2.1. The circle includes five principals and five intermediate hues.
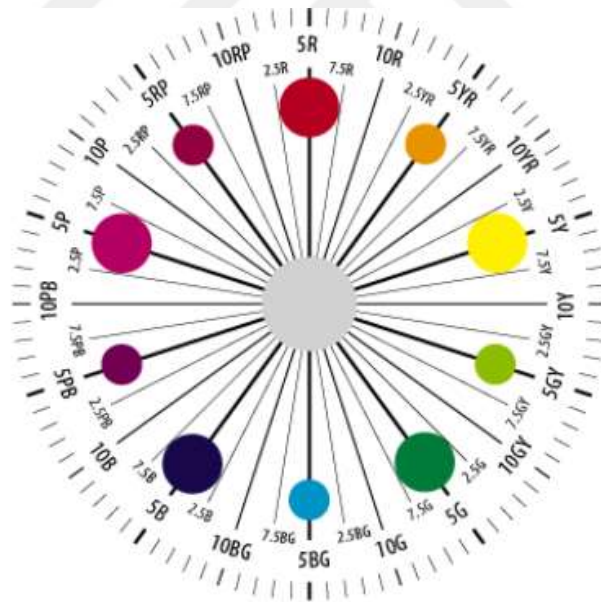
Figure 2.1 Munsell hue circle (Munsell Color Corporation ,1980, p. 1)

Four hues are unique said by Hering, which are red, green, and yellow and blue (Hunt, 2011). By adding these four unique hues to black and white makes color gray (Hunt, 1987). Similarities and coordination between colors described by Hard and Sivik (2001). RGB model is elaborated the mixture of different proportions of

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colored light and this mixing is called "additive color mixture" (Raskin, 1986). By joining all three colors red, green and blue create white color, also other intensities (Helen, 1983). This process can be done through projected light ray (Feisner, 2006). Color has informational as well as a cultural role in the human life (Martinson and Bukoski, 2005).

2.1.1 Color and light

Light is considered essential for seeing any color so if there is no light then there is no color. If you isolate the natural spectacles and beings in the dark then exposed them in sunlight then vision will be different due to the difference in wavelengths. There is also the science of light where Sir Isaac Newton (1642 -1727) proved that when a white light is beamed at a glass prism it produces a visible spectrum made of several colors which are red, orange, yellow, green, blue, indigo and violet, Figure 2.2. Also, there are wavelengths measured in nanometer from about 625 to 740, however, the human visibility is from 400 to 700 nanometers and anything beyond that is not visible and is called the infrared, ultraviolet, gamma rays, x rays, radio waves and microwaves (Rathus, 2012).
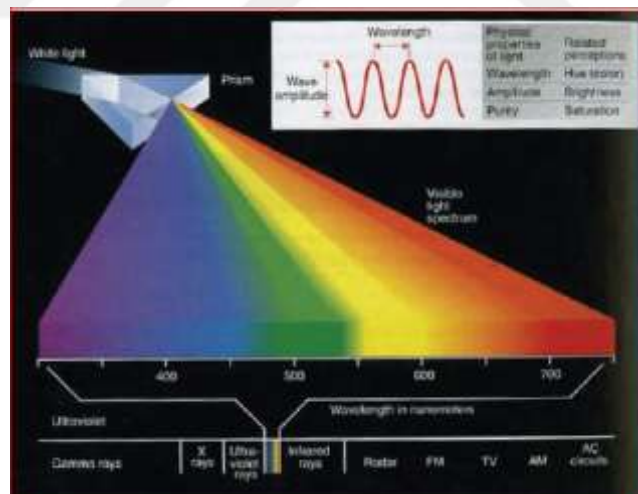
Figure 2.2 Refraction of white light by a prism into the visible spectrum—the Colors of the rainbow. Reds have the longest wavelengths and violet, the shortest (Rathus, 2012).

2.2. Color theory

Color theory contains many definitions, concepts and applied designs to create harmonious combinations of colors. For example, using two opposite colors or three colors around a color wheel. However, there are main categories of the color theory that are logical and useful: Colors wheel, Color characteristics, Color harmony, and the context of how to use color (Moton, 2012).

2.2.1. Color Wheel

It is a traditional wheel that represents the colors from their dyes and is composed of 12 colors including the primary colors which are red, yellow and blue, the secondary colors which are orange, green and purple and the tertiary colors which are the product of a mix of the primary and secondary colors. This color wheel is used in multiple fields such as art, painting as well as interior design and architecture. The wheel was developed by physicist Herbert Evis 1882-1953 then it was developed by the German artist Johannes Itten 1888 – 1967, Figures 2.3 and 2.4 (Rathus, 2012).

And in the 20th century, the American Albert Munsell 1858 - 1981 colored the color wheel with 10 different colors and that categorization was used in national agencies and standards offices as well as in several countries such as the United Kingdom, Germany and Japan. The advantages of the Munsell wheel is that it has five primary colors, the red, yellow, green, blue and purple while the five secondary colors consist of the reddish yellow, yellowish green, greenish blue, bluish purple and purplish red (Rathus, 2012).

Figure 2.3 The color circle conceived by Sir Isaac Newton (Rathus, 2012).

Figure 2.4 The development of color wheel over the years (Moton, 2012)

2.2.2 Color Properties

1. Hue or color

The hue property of color is the name of the color like yellow, green, blue and the color wheel represents the basis of colors in the visible spectrum and contains 12 colors in full saturation as shown in Figure 2.5 (Poore, 1994).
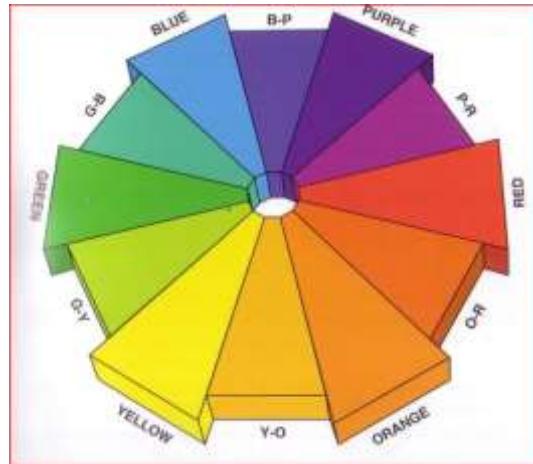
Figure 2.5 Color wheel (Poore, 1994)

2. Value or lightness

It is the second property of color and it has to do with the lighting and darkness meaning the value of color is light when white color is added to it and the value would be dark when black color is added to it as shown in Figure 2.5 (Poore, 1994).

3. Chroma Saturation

It is the third property of color and has to do with the density of the color and depends on adding gray to the color. The value of the colors in the Chroma does not change but just the density of the color changes, Figure 2.6. Some useful terms related to the density are like shade, tint, and tone, Figure 2.7.
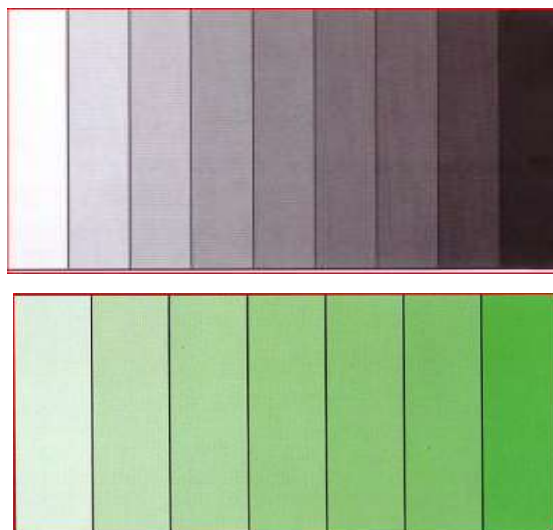
Figure 2.6 Gray value scale and green value scale (Poore, 1994)
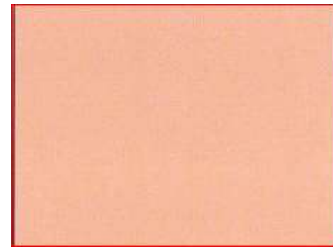
FULL INTENSITY   TINT

SHADE   TONE

Figure 2.7 Tint, shade, and tone of red (Poore, 1994)

2.2.3 Additive and Subtractive Colors

Additive colors are colored light rays overlapping to be produced as white color lighter in weight as in the graph shown below. White color can be reconstructed as a result of overlapping orange, red, blue, violet and green. The color yellow is produced by overlapping orange, red and green. The color indigo is produced by overlapping blue, violet and green. The color purple is produced by overlapping blue, violet, orange and red. Meanwhile the color white is the center of the primary colors (Poore, 1994).

2.2.4 Subtractive Colors

mean the mixing of the dyes rather than the lights. It is closely related to the subject of color wheels of Evis and Munsell. It is the most important for the practical experience of an artist. When the dyes are mixed you get the color you desire as shown in the Figure 2.8 (Rathus, 2012).

Additive color Mixtures

Subtractive color

Figure 2.8 Additive and subtractive color mixtures (Poore, 1994)

2.2.5 Color Contrast

Color contrast is used to express the degree of clarity of shapes. Therefore, it illustrates the difference between the intensity and the value of colors and this contrast comes in several forms including:

- Contrast in primary colors. This contrast is considered a strong contrast compared to other colors.

- Contrast in Subsidiary colors. This is considered from the second degree with less contrast from the primary colors.

- Contrast in different colors and this kind is at a lower degree than the other kinds and the difference is based on saturation and value of color. There is as well a contrast between cool and warm colors.

Figure 2.9 shows the vision sensation from the same color when different background are used. The blue square in a white background looks brighter with

more value. When looking at the same square on a black background, the color has less value and less brightness (Pile, 1997).
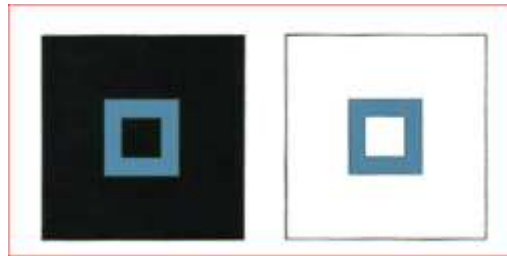
Figure 2.9 Color in different value contexts (Poore, 1994)

2.2.6 Warm Colors and Cool Colors

The colors usually point to warm and cool and the colors on the wheel are easy to separate between warm and cool. The colors red, orange and yellow are considered warm, while green, blue and purple are considered cool as in Figure 2.10 below.
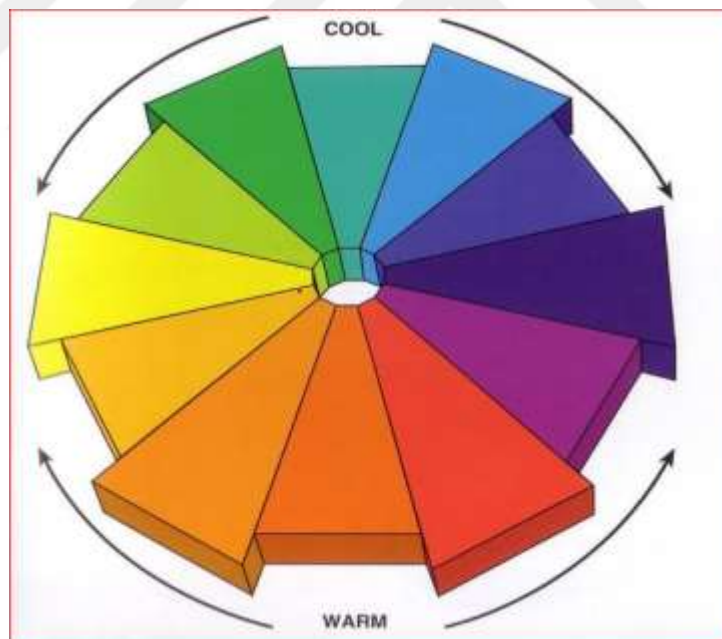
Figure 2.10 Cool and warm colors (Poore, 1994)

2.2.7 Color Harmony

It is the compatibility process in colors in a way that satisfies the eye to create a feeling of balance in the visual experience. When something is not harmonic the human brain rejects that said thing and when the visual experience is balanced then the brain accepts it. There are several ways in which a color becomes in harmony, for example, using one color with its several degrees or using three close colors in order to strike the appropriate balance. To give an example the idea is explained in Figure 2.11 below.

"Similar hue and value. Note that the furniture in this light and airy interior is a grayed-down version of the wall and ceiling color. The hue and value remain constant and only the chroma varies."

Figure 2.11 Color harmony (Moton, 2012; Poore, 1994)

2.2.8 Color Usage in Interior Design

There are several ways to use colors in interior design such as using one color with multiple degrees, using colors next to one another on the color wheel and also using completed colors against each other as well as using three or four colors forming the shape of a triangle and a square in a way that the colors are in harmony and consistency with each other.

1. Monochromatic schemes

This scheme contains a variation of one color. The safe method when using this variation is to use the average in the lighter value of the color as explained in Figure 2.12 (Poore, 1994).

Figure 2.12 Monochromatic colors blue and green for the kitchen gives harmony in the color.

2. Complementary schemes

Complementary colors are the ones next to each other on the color wheel and which are good to realize the color harmony and the general aesthetics. The physiological

effect of the complementary color scheme depends on choosing the suitable colors (Poore, 1994). Examples are shown in Figures 2.13 and 2.14.

Figure 2.13 The bold, rich colors of this setting create a lively environment. The whole space becomes one large furniture
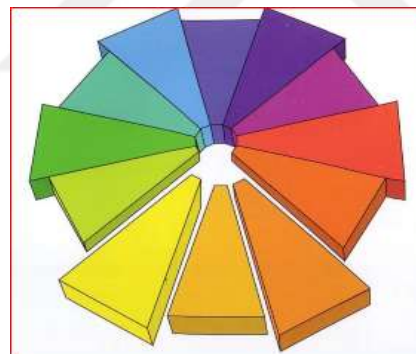
Figure 2.14 Analogous colors

3. Split complementary

This scheme would be one color along with two other colors from the opposite side on the color wheel. This split scheme is full of life and more effective. See Figures 2.15 and 2.16 (Poore, 1994).

Figure 2.15 The yellow-green the walls the yellow-orange ceiling and woodwork in combination with the deep colors of the carpet provide an excellent example of the success of split complementary color scheme.
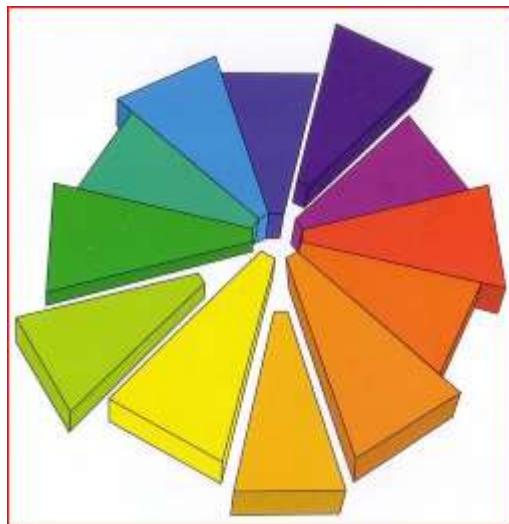
Figure 2.16 Split complements

2.3. Impact of Colors in Interior Design on People

It has been recognized that there is the significant and observable influence on psychological aspects of reactions in human beings (Pile, 1997). Light and color are undoubtedly main attributes of environments which are created by the human beings and it has a powerful impact on physiological and psychological well-being. Many researchers have argued that color has the power to influence the responses of psychological nature in humans including variations in attention and mood (Shabha, 2006). Engelbrecht (2003) has argued that the brain releases a certain kind of hormone as a response when a color is being transmitted by the eyes of the person and it impacts energy level, mental clarity ad moods. Interestingly, the impacts of colors in surroundings doesn't only influence someone through visual aspects, but it can impact them without even seeing it as wavelengths of the colors are being absorbed by the skin of living beings. Various studies have portrayed the fact that variation in the colors in the surroundings can result in lowering the blood pressure as well as lead to minimizing the aggressive behavior in children who are blind as well as who are sighted. According to Kalia (2013), a color may be known as the type of energy that may have an influence on emotional feelings and the mind of a person. A normal person may feel glum on a rainy day and cheerful on a sunny day keeping other things constant. On the other hand, bodily responses are being affected by the color through psychological attitudes, and it also influences the hormonal activities and nervous system of the people. The amount and kind of energy that may be influenced in the space by colors may evoke certain responses of feelings like it can cause a feeling of depression, cheer someone and stimulate or calm someone.

Kalia (2013) in the meta-analysis of research on this topic found different psychological and physiological impact of different colors. The red color was found to speed up respiration rates and heart beat while raising the blood pressure of the person and heightened the smelling sense of person involved in the study (Vodvarka, 2008; Engelbrecht, 2003). The study of Pile (1997) explored the impacts of yellow color by identifying the fact that yellow color has influence with a lesser degree of aggressiveness than red color, illuminates space, considered happiest color as well as cheerful and sunny by most of the people. In addition, a green color has usually been

chosen by the people who have the habit of speech, are social, creative, intelligent, and feel the appetite for the food intently as this color is considered as a refreshing, relaxing and calming. According to the study of Verghese (2001) blue color is comfortable, restful, calming and lowers the rate of respiration, pulse rate and blood pressure in real life context. Orange color has happy implications. As it causes encouragement, attraction and increases the flow of oxygen through the brain of the human beings (Syebert, 2007). The White color is simple of blankness, purity, cleanliness and simplicity while black color choice portrays dignity, seriousness, etc. According to Pile (1997), violet color shows the expression of being artistic and sensitivity of a person, playful, magical, mystical and dignified.

2.4. Color Psychology

Color has an impact on physiology, as per Shehata (2000); Jin et al. (2009), the color becomes the cause of irritation, relaxation, change of heart rate, change in blood pressure and also affect brain waves. The color effect is used as a therapy for treatment of depression and cancer. In psychology, colors play their role in the perspective of moods and emotions. Colors used in psychological treatment of aggression and anxiety (Jin et al., 2009).

According to Kalia (2013), there is a link between the color and the form or shape of the space. Thus, the usage of color could change the perception of the space user of the interior. As per Bauhaus theory, the straight-line shapes are for instance connected to the red color, which is also related to the square shape. Furthermore, the triangle shape is connected to the yellow color, while the blue is connected to the circular shape. Subsequently, there is a strong tie between the choice of the space form and its color, as the color can change the way the interior is perceived.

2.5. Color Preferences in Interior Design

Color has the essential character of interior design as it may be instantly recognized and provides the people with a perceptual that is sensual and visual. Every color is being portrayed by mood certainly and is linked with the environment

in a certain way that affects the perception of the people and emotion regarding that space. Nowadays people are more concerned about the environment they are living in, specifically with the emergence of the trends in interior design which are oriented by the human beings; now the interior design will embody its possessed natural quality and respect the human beings. Humanization is the state of interior or exterior design, which is molded according to the requirements of human beings. In addition, these colors and their use in interior design have many physical and mental benefits for the well-being of the humans (Read & Upington, 2009). Color helps someone to make a sudden judgment with their subconscious. Singh (2006) found that people make up the perception in their subconscious within ninety seconds when they interact with either other people or the products of any kind. About 60 to 90 percent of the people who made up their mind based on their assessment on colors alone. This is the reason the colors and their appropriate use are essential for the designers in order to comprehend the preferences of the customers regarding colors as a part of planning the whole of effective design. The response of ultimate customers towards a color obviously has a huge influence on the color scheme selection of the designer for any residential or commercial building. Hence, the process of choosing the colors by designers and making the decision is usually being based on the preference of the target customers and their response to the color. Elliot and Maier (2007) have proposed that the designers must take care in how the color red is being utilized in contexts of achievement and described how specific colors can play a role as the subtle cue of environment that has the significant impact on the behavior of the people in surrounding (Elliot and Maier, 2007).

2.6. Colors for Residential Buildings

The psychology behind preference of colors by the people of their residential buildings and commercial buildings has been studied by a number of researchers since the 19th century. According to Best (2012), the research on this issue was carried out and focused in 1893 by Jastrow. In his study, he used a sample size of around 4556 respondents, who were asked to select their favorite single color while twelve color options were given to them. The responses from the respondents were ranked according to the frequency of response given to each by the sample of the

study. Since that study conducted by Jastrow (1893) a lot of studies based on different research designed and scope has been carried out around the globe (Best, 2012). Only measuring the frequency of color preference by the people for interior design is not enough, the real query is the factors affecting these color preferences by the people.

Many researchers have tried to explore one or more factors influencing the behavior of people while choosing a color or a mixture of colors for the interior design of their homes. The first factor which has been studied by a number of researchers is gender, although it is a controversial variation, but it is still studied whenever the issue of color preference is being studied (McManus & Hoffman, 1981; Ling & Hurlbert, 2011). As it is a natural phenomenon that pinkish colors are being associated with girls and blue, black are being associated with boys as shown in figure 2.17.

Figure 2.17 Color preferences in interior design based on gender

Other factors have also been studied including the age of a person, as younger people prefer relatively more variations in the colors as compared to elder people (Sagawa & Takahashi, 2001; Ellis & Ficek, 2001). Another factor which has engrossed the attention of many researchers is the impact of cultural background on color preferences of the people especially in their residential buildings' interior design (Shin et al., 2012). Personality and other factors like social status also have a proven strong impact on color preferences of the people in different contexts (Jackson, 2011; Patel, 2014). In addition, educational background of a person also influences its

preferences of colors according to a number of research studies (Hanafy & Sanad, 2015).

2.7. Factors affecting the Color Preferences of People

The research on the topic of color preferences is currently an area of interest for interior designers, exterior/architectural designers, neuroscientific researchers and cognitive psychologists as giving the preferences is something that may impact both of these professions equally. There are several factors which have been studied by a number of researchers as the determinants of changes in the behavior of the people while selecting a color for their clothing, accessories and more specifically for the interior design of their houses (Saito, 2015). Some of these factors have been discussed in detail in forthcoming sections of the study including age factor, gender bias, and social status, the personality of a person, cultural background, and educational background.

A potentially confounding element that has been studied in most of the studies with vague yet important results for examining the differences and similarities in color preferences across the masses, specifically due to gender, is an age of the person. It has overtly been clearer with the time and more of the research that aging and development influence preferences of the colors in the people, which not only explains the variation in the vision of the color, cognitive factors, and linguistic ability. As the study of Dorcus (1926) has acknowledged that with the growing age of a person his/her preferences also change, where he admirably concluded the evidence of scientific nature which were present at that time. It was argued by Dorcus (1926) about the study conducted in 1900 by Holden and Bosse that trend of color preferences emerges from the color red towards blue color spectrum as the children grow older while it was also founded by him that the preferences of the children were decidedly impacted by association of the color which is formed by them at that time.

More recently, in his one of the study Dittmar (2001) has tried to compare the responses, of older people between the age group from 52 to 90 and younger people varying from the age group of 19 to 44, to explore their preferences towards colors

and asked them to select their least favorite and more favorite colors while the options of the colors were given including the color yellow, red, green and blue. The findings from this research study suggested that blue color is being preferred universally by all age groups while preferences for this color decreased with the growing age of the respondents, while it was concluded that with advancing age preference for red and green color inclined steadily. Another study in this area conducted by Bonnardel et al (2006) has explored the preferences of different colors of 21 samples of Munsell, for the age group of 60-70 and other age group of 20-30 years subjects, by utilizing the method-of-triads, and found that the difference in gender in the preferences of the colors were reduced significantly in subjects from the older age group as compared to adults of younger age group involved in the study.

In another study conducted by Ling and Hurlbert (2011) in which the population of different age and gender group was selected by them from the United Kingdom (UK) in which the result found that the impact of age on a preference of color was minimal in different age groups. However, the difference in gender observed variation at a significant level in which most magnified variation was observed in the age group of 11 to 12 years, in which the females from this age group tend to prefer red-purple and simple purple color more than the boys of the same age, while boys between 11 to 12 years age group preferred yellow and green color more than the females; however, these colors and preferences for shades of the colors varied with growing age groups. Lower discrimination in colors in the older age group that is induced by changes in the spectral attributes of the lenses of older people, which can account for the flattering of pattern of preferences in hue of the colors for age group, including older people as comrade to the groups with the younger age group, but it cannot be accounted for reducing the difference of gender (Sagawa and Takahashi, 2001).

In order to eliminate the uncertainty in the specification of stimulus, Franklin et al., (2010) has utilized the alike stimuli as utilized for studying the adult differences by Ling and Hurlbert (2007), and studied to explore that infants from the age group of 4 to 5 months had portrayed lowest preference for hues of greenish colors while demonstrated higher preference for hues related to reddish color. These studies

collectively demonstrate the fact that variations in preferences of the colors starting from infancy to old age explores that neither differences in gender and absolute color preferences are hard-wired since the birth of a person. But, the difference in gender and color preferences varies over the time period. This variation in preferences can, in turn, be forced by predispositions which are hard-wired, which can be molded through many developments and biological factors including maturation of a person or colors' conceptual frameworks (Sandhofer, 2006).

According to the study conducted by Hanafy and Sanad (2015), there is usual evidence for the fact that the social status of a person and the environment have a direct relationship with the color preference development regardless of the gender, age, and other demographic factors. These personality traits are being learned by the people through their experience with educational background and social status to which they belong (Jackson, 2011). Busato et al. (1998) has established this relationship by arguing that different learning styles have different impacts on five of the personality traits including agreeableness, neuroticism, openness, conscientiousness, and extraversion etc. In his master's thesis, Gavin (1982) has conducted a study on preferences for the colors depending on different social classes that is upper lower social class, lower middle class and upper class. He found that preferences of people belonging to different social class varies considerably. McInnis (1964) has conducted the study to explore the socioeconomic factors affecting color preferences of the people and the results of study portrayed the fact that there is a tendency in upper-middle class to opt the colors and patterns with dull-cool affect and shades. On the other hand, people from lower-middle class were observed choosing predominately cool and bright colors. Additionally, this social class was found to opt the colors with warmer shades which were not chosen by any other social class; however, statistical results for this relationship were not strong enough to prove this theory.

According to the study carried out by The Kent University (2016), different personality traits and the careers of the person have a strong impact on color preferences by these people. According to this study, the color red was given positive response by 64.3% of the people and it was preferred by the people who are agitated, risk-takers, powerful, extrovert, arousing, rebellious, happy and energetic and have

an authoritative personality type. Yellow color was given 93.9% of positive response and was preferred by the sociable, persuasive, extrovert, and enthusiastic people. Positive responses for green color accounted for 95.9% and it was preferred by introvert, caring, controlled, relaxed and calm people. In addition, the same study argued that blue color got positive response from 79.6% of the respondents and was preferred by loyal, creative, happy, courteous and committed people. Purple color was preferred by anxious, deep, vigorous, excited people. White color was preferred by 61.2% of the people and preferred by innocent, simple, peace loving, hopeful and introvert people while black color was preferred by strong, old, rick, anxious, conservative and creative people.

A recent study conducted by Cigic and Bugarski (2010) explored the relationship between color preferences of the people and personality traits of those persons. The findings fetched from the investigation demonstrated that there is difference in personality traits of a person has an impact on the preferences of the colors by these people and different colors has impact on building some of the personality traits as well. It was founded in the study that there was a difference in the preference of color by subject preferring the colors with bright shares, like yellow or red, and subjects preferring the colors with dark shades including black, gray and brown color. Social introversion, extroversion, anxiety and neuroticism were prominent traits of the personality who preferred darker shades of the colors; however, activity and aggression were personality traits of the subjects who selected brighter shades of the colors.

In the research paper "Color associations with different building types: An experimental study of American college students" students' preferences for different colors are discussed, such as red color are considered as dynamic and green as a soothing and relaxing Kaya (2004). For residence, color blue is highly rated by students due to consideration of inner security and promoting mental relaxation. It is concluded that lighter tones are more preferred than darker by students. Because lighter tones create a feeling of openness and calm atmosphere. Darker spaces are considered make spaces smaller and less comfortable (Ballast, 2002). On the second number red is preferred by college students because of brick façade and on the third number yellow color due to school buses color which reminds them their childhood

memories (Kaya, 2004). The yellow color is considered as related to the expression of thought and to improve memory (Adams and Osgood, 1973).

Students associated red color to joy and entertainment (Kaya and Crosby, 2006). The least color for residence is purple as students' preference. Students associate color orange to energy and fun because it reminds the vacations energetic moments. In the study of Kaya and Crosby (2006), the conclusion is that every student associated his preference for the color to a memory and experience. In Turkish college study, students prefer green color for their religious buildings and associate the green color with Islam religion. For churches, white color is symbolized as a holy color as per students described in the study (Kaya, 2006). In the study Hanafy and Sanad (2015), concluded that color preferences for the living room of students and educational background have a strong positive relationship. According to Dorcus (1926), college-age students has a great influence towards color preferences and decision making regarding color selection than children of age 9-year age and old people of 60-year age.

Bakker et al. (2015), said that university level students select blue color more often while vocational level students have a higher preference for light pink and green. In the study of Hanafy and Sanad (2015), the data are presented to describe color preferences for the living room of students of first and final years of Graphic design and IT department as shown in Figure 2.18.
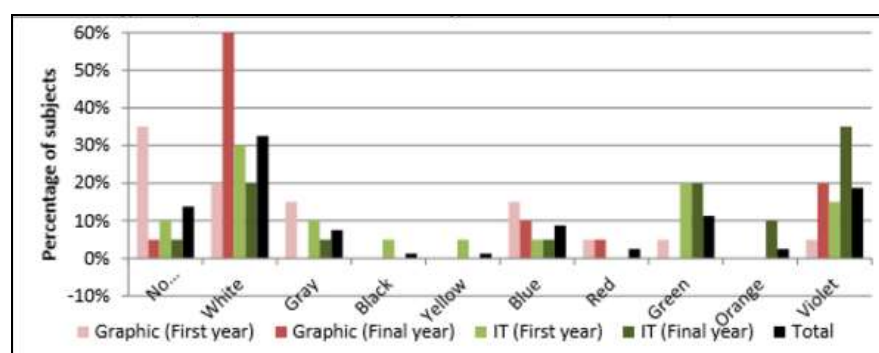

Figure 2.18 Color preferences for living room of students of graphic design and IT departments in first and final years (Hanafy & Sanad, 2015. p.442)

White is the most preferred color with the 33% percentage follow by violet with 19%, no preference 14%, green with 11%, blue with 9%, gray with 8%, red

with 3%, orange with 3%, yellow with 1% and black with 1%. These results were agreed with the results of Bakker et al., (2015). For the final year, the student's results were positively correlated with both variables (color preferences and educational background). It means there is a significant relationship between education and color preferences (Hanafy and Sanad, 2015). Saito (1996) said that for Taiwanese-Korean and Japanese most preferred colors are blue and white. According to Lincoln (2012), for teenager bedroom is a place to self-maintain, sleep, eat, prepare for exams, do homework, read magazines, listen to music and watch TV.

2.7.1. Cross-cultural Background and Color Preferences

Different cultures give different meanings to different colors. For instance, In countries like Argentina, Denmark, and China red color is considered as a symbol of good luck while in Chad, Nigeria, and Germany it is being considered the symbol of bad luck (Neal et al., 2002). According to Neal et al., (2002), in New Zealand, Australia and the United States of America, white color is being considered as the color of purity and happiness while it is being assumed as a symbol of death in East Asia. According to Hupka et al. (1997), green color represents disease and danger in the country like Malaysia while it portrays envy in Belgium and the United States of America.

According to a study conducted around six decades ago in 1941 by Eysenck, all of the fully saturated color hues are being preferred by everyone in a general order, where blue is being preferred most with the last ranking given to yellow color while orange, red, purple and green lies in between the highest and lowest ranking. He concluded that no difference was found in preferences made by the people from different cultural backgrounds for specific colors. In addition, Choungourian (1968), in one of his study, carried out the study and reported the preferences of Kuwaiti, Iranian, Lebanese and America university students. In his study, he found that variables related to the culture of a person are underlying factors as a determinant of preferences of colors as American participants of the study least preferred the blue-green color, while these colors were preferred by Kuwaiti and Iranian subjects. He concluded that blue and red colors were given highest preferences and ranking value

by the participants from America while Kuwaiti university students ranked these colors at lowest.

According to the study of Saito (2015), it was demonstrated that similarity in preference of color and cross-cultural differences among nine groups from different cultural groups. The cross-cultural groups included Japanese, non-Japanese living in Japan, Japanese-American residing the United States of America, South Africans, Papua New Guineans, Australians, Danes, Germans, and Americans. Around four hundred participants were requested to select their favorite colors and the least liked colors from the 65 chips of colors provided to them. Results of this study portrayed that vivid blue color was the color that was highly and commonly preferred by people of all cultural background; however, for other colors, it was found that cultural difference and related variables also have a strong influence on these preferences.

Babolhavaeji (2015) confirms the idea of the different preferences and meanings of the same colors across the different cultures. In a public survey, Germans have chosen the color blue as their favorite color, while yellow was chosen as the most unfavorable. The blue color was also chosen as the favorite color in Turkey to be used in decorations. However, other studies showed that despite the differences that may be found between the cultures in color favorability, similarities of liking the same basic colors may be a common result within the studies.

2.7.2. Gender Difference and Color Preferences

As other variations, change in gender also impacts the color preferences according to their gender. Color blue is more preferred by men than women, and red is the second most preferred color (Hurlbert and Ling, 2007). Gender differences are of two types: first is rank wise color preference and second is a degree of color preference such as reliability and stability. Women are founded, having strong preferences than men as well as they have the stability of preferences greater than men over short timescales. Dorcus (1926), founded the female biases for red color and concluded the same results that females have stronger preferences than males,

For example, in age 8 to 10 (147 girls; 150 boys) and in college 401 female and 403 males. Both genders like blue, but dislike yellow and red, those who preferred more red and yellow are females. Researchers found little difference between the preferences of both genders (Camgoz et al., 2002; Ou et al., 2004). Some studies found a major difference between their preferences such as Saito (1996), found that young Japanese female adults prefer pale pink but males did not prefer this color.

Red color preference does not only depend on hue, but also other two characteristics of the color such as lightness and saturation. In the study of Hurlbert and Ling (2012), the difference in preferences of both genders is significant especially in UK females prefer light colors while males prefer dark colors. According to Hurlbert and Ling (2007), the difference is again significant, the study was conducted in the UK and Chinese population and results were that the females weigh more red color than males. Also, blue and blue-yellow are positively weighted. Females are more attracted to and focused on color information. With respect to timescale, Gelineau (1981) concluded that women show the great stability of preferences over a five weeks' timescale. Helson and Lansford (1970), explored that there is the difference for pleasantness ratings for different illuminations, females prefer R, Y, and RY chips more than males, on the other hand, males prefer B, RP and BP chips more than females.

According to Sinha et al. (1970), female adults preferred red more than male adults. While early studies found that male preferred red more than females (Silver et al., 1988). The gender difference is also a driver for color preferences, because females prefer reddish and pinkish faces, due to which L-M contrast weighted more. According to Alexander (2003), this preference for reddish and pinkish color faces is due to female reproductive advantage because infants' faces are tending to be pinkish. Females disliking for yellow pronounced more than males.
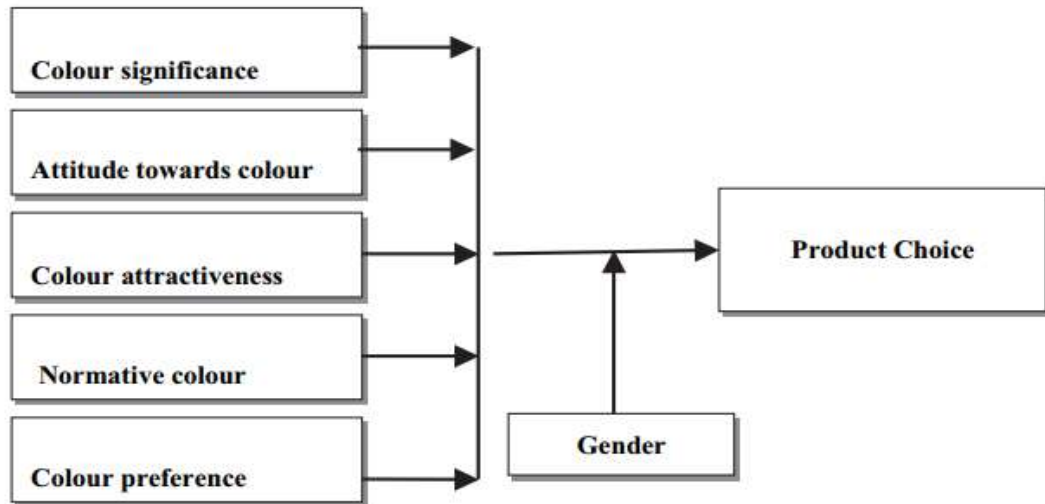
Figure 2.19 Color traits in choice with demographic factors (Funk, 2006)

Moss (2001), experimented to provide evidence for the differences in preferences of a color of gender is significant. The first experiment result was positively related to this assumption that there is the difference in preferences of males and females for colors. Male with 74 percentages chooses white cards while female only 5.3 percent choose white cards. Results show that women are more interested in color, but men are more interested in data and standard.

Moreover, there is a misconception towards the colors assigned to the genders as a stereotype. For instance, blue is usually assigned to the boys, while the red or pink is assigned to the girls. The idea behind such an assignment is the symbolism of masculinity and feminism that might be tied to their colors. A study reviewed by Babolhavaeji (2015), blue was found to be the favourite color for both genders, while men favored orange over the yellow color, and women chose the opposite. Therefore, when studying the correlation between color preference and the gender, it is important to consider other factors, including context and emotion, as well as considering the second and third choice by a person.

3. THE EXPERIMENT AND METHODOLOGY

The fundamental target of this part of the study is to highlight the exploration procedure which is selected by the researcher to gather both secondary as well as primary information, explanation of tools and methods to be utilized as a part of a request to get the outcomes from an arrangement of previously mentioned information. A complete illustration of exploration rationality, research system, and research decisions, time-horizon of examination, exploration process, and methods utilized as a part of this study, ethical considerations and limitations of the study will be discussed and explained.

In this study, the researcher expected to especially investigate the idea of preferences for the colors in the interior design of people's residential building's rooms and impact of different factors influencing the preferences of these types including the factors like age, gender, social status, personality traits, educational background, and cultural background. The principle goal is to decide those variables which may turn into the obstacle in the method for the unfaltering development rate of Omani SWFs and prescribe the fitting and most ideal answers for the administration of Oman. With a specific end goal to draw the outcomes from this exploration study, both quantitative and subjective examination techniques are utilized by the specialist. Essential information was assembled through the assistance of a survey questionnaire while optional information as writing from different sources like open libraries, private libraries, and web sources was gathered.

3.1. Aim of the Study

The objective of assessments of these viewpoints and quality of the relationship between chosen the dependent variable that is preferences for the colors in the interior design of person's residential building's rooms and variables which are

independent including gender and cultural background. This relationship will be investigated to discover the cures as the investigation of this relationship will distinguish what component impacts more on preferences for the colors in the interior design of person's residential building's rooms. Amid this procedure, the applied system for drawing the theory as given at end of this section are distinguished, and two classes of variables are conceptualized including quantitative and subjective variables. Henceforth, objectives and the central theme of the study empower the analyst to select a proper position of completing the exploration and apply the fitting techniques for this reason. The accompanying areas of this parts explain the insights about the methodologies of the strategy used to finish this paper.

3.2. Hypothesis

H_{01}: There is no impact of difference in gender of the people on their preferences for the colors in the interior design of their residential building's rooms.

H_{02}: There is no impact of difference in cultural background of the people on their preferences for the colors in the interior design of their residential building's rooms.

Moreover, other factors such as age and social status are also studied to discover any significant differences between the different categories.

3.3. Sample, Participants and Procedure

Four residential spaces are designed in this study using SketchUp, which are a living room, kitchen, bathroom and bedroom. The structure of the spaces do not change as shown in Appendix 1. However, eleven colors are applied to the wall colors according to Munsell color system and using RGB color referencing (Table 3.1). Moreover, the participants of the questionnaire are mainly divided into two groups; Turkish and Libyan, where they are mostly university students of different disciplines. The total number of participants are 161 divided almost evenly between the Turkish and Libyan Groups. The participants were presented with each model and color. Thereafter, the participant is asked about three choices of color and the emotion associated with each one of them.

Table 3.1: RGB Color Code (W3Schools, n.d.)

Color Name	RGB Code
Red	#FF0000
Yellow	#FFFF00
Green	#008000
Blue	#0000FF
Purple	#800080
Yellow-Red	#E79400
Green-Yellow	#ADFF2F
Blue-Green	#0D98BA
Purple-Blue	#730052
Red-Purple	#E40078
White	#FFFFFF

3.4. Time horizon

After research choices, the second most important step in research is the selection of time horizon which can be cross-sectional or time series. Time series is a type of data collection in which data is collected from a given sample of the population over a specific time period after regular time intervals about the same information or data. On the other hand, cross-sectional is a type of data collection in which data is collected just like as time series data collection method but the given population sample is not same, data is collected from different population samples over a specific period of time (Anselin & Arribas-Bel, 2013). In the running study, the researcher has used the cross-sectional time horizon method as the data was collected over an explicit time period from different cross sections. The population samples or cross sections were chosen randomly from different countries especially Ankara, Turkey.

3.5. Data collection and data analysis

In this research study to explain the impact of Age, gender, social status, personality traits, educational background and cultural background on the preferences for the colors in the interior design of person's residential building's rooms, the researcher has steered a broad survey in 2016. In this research, a questionnaire was set having 4 to 8 questions for each variable that are mentioned above and have five possible responses that varying from strongly agree to strongly

disagree. Questionnaires are most widely approved and used a source of data collection, especially in case if an individual in a short period of time wants to collect a large amount of data from different cross sections so that collected data may have diversity (Bernard and Bernard, 2012). They have discussed that with the advent of a wide range of statistical software, questionnaires have got much importance than before, to test in the favor questionnaires like SPSS and excel. The questionnaire was divided into 5 sections and each section had questions related to one particular independent variable. As far as the selection of the sample is concerned the respondents who were chosen to respond to the questionnaire were from different social status, age, personality traits, educational background, gender and cultural background. Respondents were requested to respond to questionnaire without any manipulation. The results of these questionnaires are generalized because the data collected is approximately from people of different variables with different age and other cross sections.

3.5.1. Data Analysis Models

Albeit each progression of the procedure of exploration is essential, however, most critical among these means is a selection of models for the purpose of data analysis. Various models for data analysis are accessible including, t-test investigation, regression and correlation analysis, descriptive and thematic analysis and so on. In spite of institutionalization of information investigation models, the continuous change can be seen in these models over the span of time. In this study, so as to watch the relationship amongst independent variables and dependent variables, the analyst has picked descriptive statistics and variance testing (one-way ANOVA) as the model of data analysis; however, the graphical representation of different frequencies will also be utilized.

3.5.2. Data analysis tools

There are a number of tools available to researchers that can be used for the analysis of data such as SPSS, STATA, E-views, excel etc. however as far as the running research is concerned the researcher has chosen SPSS and excel. SPSS is a statistical software for the data analysis used in social sciences. This tool can handle a large amount of data at a time so is used for complex data analysis.

4. DATA ANALYSIS AND RESULTS

This chapter provides the results of the case study and the statistical analysis in order to test the hypotheses established earlier. Moreover, key comparisons and correlations are presented in order to enrich the research. The template used for the questionnaire and the designed models with the different colors are presented in Appendix 1 for reference.

4.1. Descriptive Findings

The questionnaire used in the case study is mainly divided into two main sections, which are:

1. Demographic and personal data

2. Color preferences and motions

Therefore, the descriptive discussion of the results are divided into those two categories, while the statistical analysis discusses the correlations between the data from the two sections. The total number of participants is 161, divided into 81 questionnaires for Libyans and 80 questionnaires for Turkish. The setting of the research includes models of residential spaces (Living room, bedroom, kitchen and toilet) that are given the different colors of the Munsell color system as shown in Appendix 1.

4.1.1. Demographic and Personal Data

The first question in the questionnaire address the age category of the participants. 37.89%, 32.30%, 22.98%, 6.21%, 0.62% for the categories 15 to 25 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, and 55 years and above respectively. Furthermore, as a comparison between the two cultural groups participating the

study, the majority of the Turkish group is distributed over the ages 15 to 34, while the Libyan participants are mainly focused on the ages between 25 to 44, as shown in Figure 4.1.
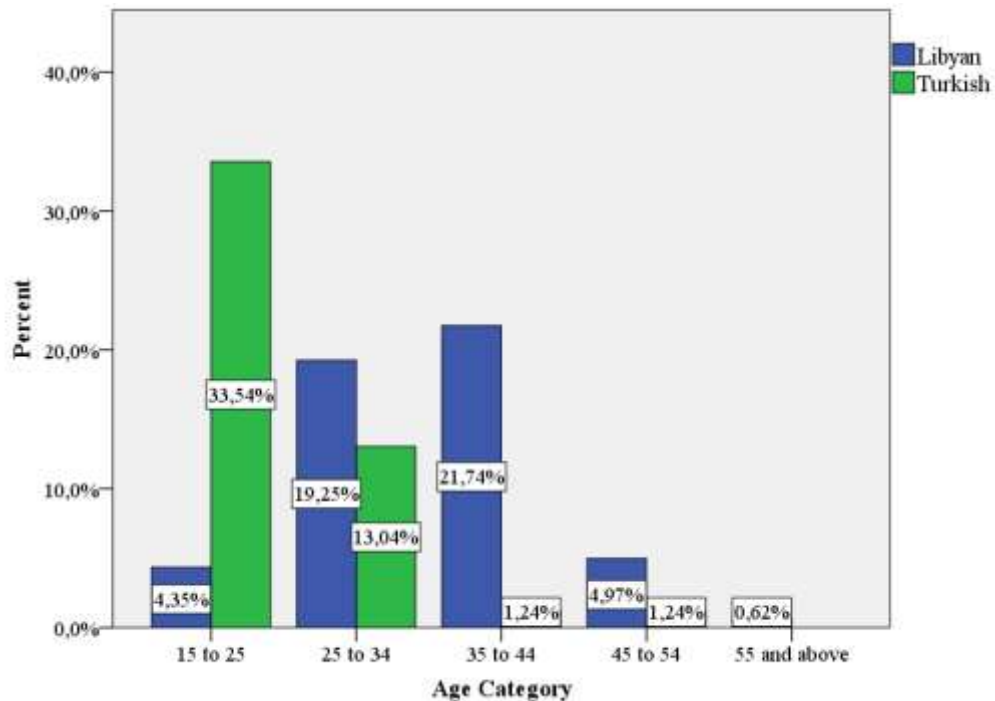
Figure 4.1: Comparison of age categories distribution between the Libyan and Turkish participants

Moreover, the gender comparison is shown in Figure 4.2, where the numbers of the samples are almost similar between the Libyan and Turkish participants. The sample is collected in this manner to reflect the most equal comparison between the two study groups. Furthermore, Figure 4.3 shows a marital status comparison between the two cultural groups, where the majority of the Libyans are of a married status, and the Turkish are of a single status. However, 42.23% of the participants chose to keep their marital status as confidential. Figure 4.4 shows that the vast majority of the Turkish participants are students, while the Libyan participants are distributed among the different categories, as illustrated.
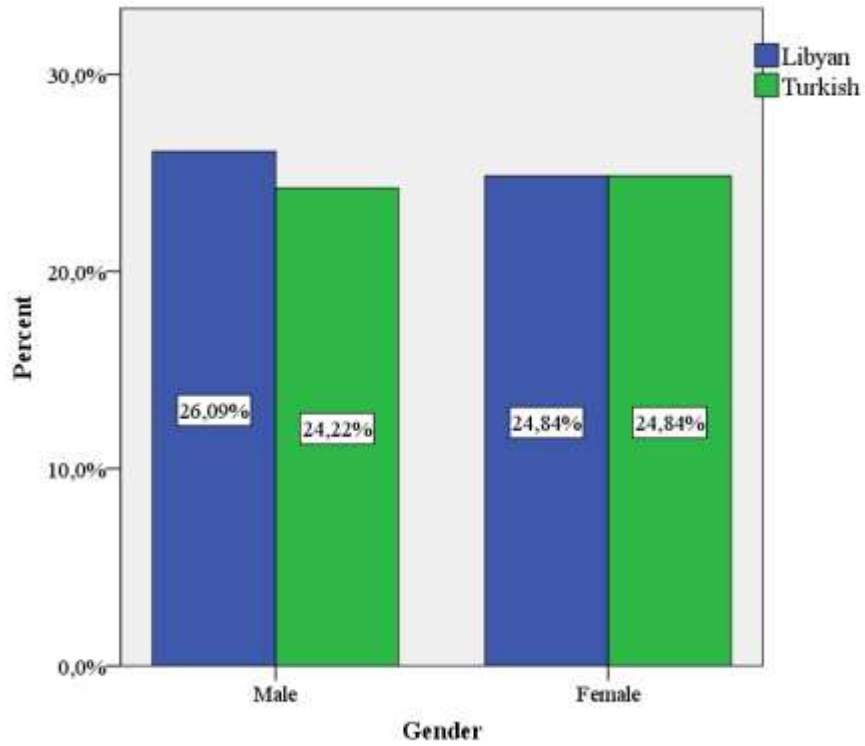
Figure 4.2: Gender comparison between the Libyan and Turkish participants
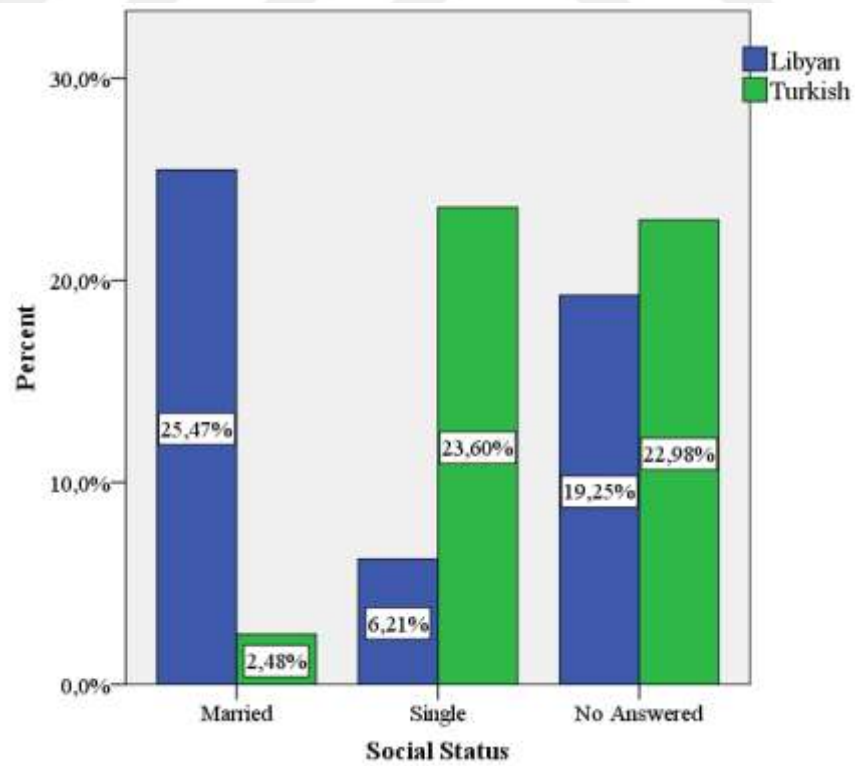
Figure 4.3: Marital status comparison between the Libyan and Turkish participants
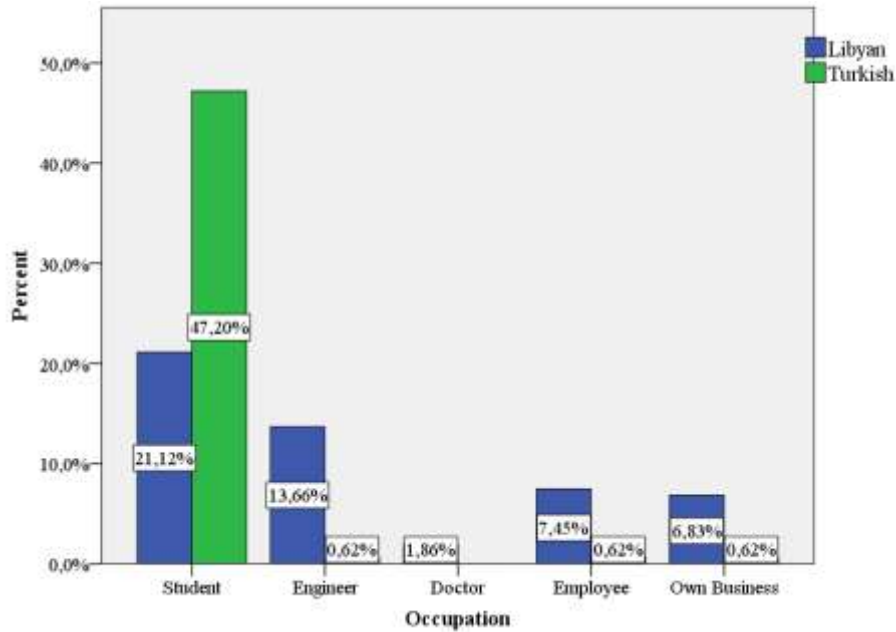
Figure 4.4: Occupations of the questionnaire participants

4.1.2. Color Preferences and Emotions

For the living room the first most chosen color for the space is the white color, while modern is the most emotion associated with the color assignment. Moreover, the Blue-Green color and Relaxing are the second choices for color and emotion in the living room. Furthermore, White is again the third most chosen color in the living room, while Energetic is the third most chosen emotion in the same space. The results of the three-color choices for the living room are shown in Table 4.1, while Table 4.2 shows the emotions associated with each of the color choices within the same space.

Table 4.1: Color choices for living room

		First		Second		Third	
		No.	%	No.	%	No.	%
Valid	Red (FF0000)	22	13,7	11	6,8	14	8,7
	Yellow (FFFF00)	13	8,1	8	5,0	10	6,2
	Green (008000)	10	6,2	12	7,5	5	3,1
	Blue (0000FF)	3	1,9	7	4,3	5	3,1
	Purple (800080)	11	6,8	11	6,8	6	3,7
	Yellow-Red (E79400)	17	10,6	26	16,1	21	13,0
	Green-Yellow (ADFF2F)	5	3,1	8	5,0	8	5,0
	Blue-Green (0D98BA)	17	10,6	**30**	**18,6**	27	16,8
	Purple-Blue (730052)	12	7,5	20	12,4	13	8,1
	Red-Purple (E40078)	8	5,0	9	5,6	18	11,2
	White (FFFFFF)	**43**	**26,7**	19	11,8	**34**	**21,1**
	Total	161	100,0	161	100,0	161	100,0

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Table 4.2: Emotions associated with the color choices for living room

		First		Second		Third	
		No.	%	No.	%	No.	%
Valid	Calm	29	18,0	18	11,2	14	8,7
	Peaceful	27	16,8	15	9,3	13	8,1
	Modern	**34**	**21,1**	29	18,0	24	14,9
	Relaxing	21	13,0	**40**	**24,8**	29	18,0
	Simple	5	3,1	9	5,6	19	11,8
	Energetic	29	18,0	29	18,0	**34**	**21,1**
	Warm	1	,6	7	4,3	7	4,3
	Romantic	2	1,2	4	2,5	8	5,0
	Enjoyable	7	4,3	3	1,9	4	2,5
	Clean	2	1,2	1	,6	4	2,5
	Pure	4	2,5	6	3,7	5	3,1
	Total	161	100,0	161	100,0	161	100,0

For the bedroom, the first most chosen color is red, while the first chosen emotion is romantic. As a second choice, yellow red is the most chosen color and romantic is again the second choice. Moreover, white and modern are the third most chosen color and emotion. Tables 4.3 and 4.4 shows the three choices of color in the bedroom and the associated emotions with each choice, respectively.

Table 4.3: Color choices for bedroom

		First		Second		Third	
		No.	%	No.	%	No.	%
Valid	Red (FF0000)	**37**	**23,0**	13	8,1	18	11,2
	Yellow (FFFF00)	8	5,0	7	4,3	8	5,0
	Green (008000)	8	5,0	5	3,1	3	1,9
	Blue (0000FF)	10	6,2	12	7,5	10	6,2
	Purple (800080)	16	9,9	16	9,9	13	8,1
	Yellow-Red (E79400)	12	7,5	**25**	**15,5**	14	8,7
	Green-Yellow (ADFF2F)	1	,6	8	5,0	9	5,6
	Blue-Green (0D98BA)	14	8,7	20	12,4	23	14,3
	Purple-Blue (730052)	15	9,3	19	11,8	14	8,7
	Red-Purple (E40078)	7	4,3	18	11,2	15	9,3
	White (FFFFFF)	33	20,5	18	11,2	**34**	**21,1**
	Total	161	100,0	161	100,0	161	100,0

Table 4.4: Emotions associated with the color choices for bedroom

		First		Second		Third	
		No.	%	No.	%	No.	%
Valid	Calm	22	13,7	16	9,9	17	10,6
	Peaceful	14	8,7	13	8,1	12	7,5
	Modern	18	11,2	23	14,3	**26**	**16,1**
	Relaxing	16	9,9	16	9,9	23	14,3
	Simple	3	1,9	1	,6	7	4,3
	Energetic	7	4,3	9	5,6	7	4,3
	Warm	23	14,3	21	13,0	22	13,7
	Romantic	**36**	**22,4**	**30**	**18,6**	17	10,6
	Enjoyable	16	9,9	24	14,9	23	14,3
	Clean	4	2,5	1	,6	5	3,1
	Pure	2	1,2	7	4,3	2	1,2
	Total	161	100,0	161	100,0	161	100,0

For the kitchen, red is chosen as the first choice for the space and clean is the emotion assigned at the same place. Furthermore, in the second choice for the kitchen color and emotion are yellow-Red and modern, respectively. As the third choice, white and modern again have fallen under the color and emotion. Tables 4.5 and 4.6 show the color choices for the kitchen and the associated emotions, respectively.

Table 4.5: Color choices for kitchen

		First		Second		Third	
		No.	%	No.	%	No.	%
Valid	Red (FF0000)	**33**	**20,5**	8	5,0	19	11,8
	Yellow (FFFF00)	29	18,0	14	8,7	14	8,7
	Green (008000)	10	6,2	12	7,5	5	3,1
	Blue (0000FF)	5	3,1	5	3,1	6	3,7
	Purple (800080)	10	6,2	13	8,1	1	,6
	Yellow-Red (E79400)	15	9,3	**27**	**16,8**	16	9,9
	Green-Yellow (ADFF2F)	4	2,5	17	10,6	7	4,3
	Blue-Green (0D98BA)	9	5,6	26	16,1	22	13,7
	Purple-Blue (730052)	8	5,0	11	6,8	15	9,3
	Red-Purple (E40078)	6	3,7	8	5,0	12	7,5
	White (FFFFFF)	32	19,9	20	12,4	**44**	**27,3**
	Total	161	100,0	161	100,0	161	100,0

Table 4.6: Emotions associated with the color choices for kitchen

		First		Second		Third	
		No.	%	No.	%	No.	%
Valid	Calm	17	10,6	23	14,3	23	14,3
	Peaceful	0	0,0	0	0,0	1	,6
	Modern	3	1,9	**40**	**24,8**	**29**	**18,0**
	Relaxing	32	19,9	23	14,3	22	13,7
	Simple	21	13,0	10	6,2	27	16,8
	Energetic	8	5,0	7	4,3	6	3,7
	Warm	11	6,8	5	3,1	3	1,9
	Romantic	2	1,2	1	,6	2	1,2
	Enjoyable	10	6,2	10	6,2	7	4,3
	Clean	**35**	**21,7**	18	11,2	23	14,3
	Pure	22	13,7	24	14,9	18	11,2
	Total	161	100,0	161	100,0	161	100,0

Finally, for the bathroom, white is the first choice for the survey participants for the color, while the associated emotion is "clean". Moreover, green-yellow and modern are the second choices for the space. The third choice for the bathroom are the white and modern again. Tables 4.7 and 4.8 show the color choices for the bathroom and the emotions associated with the color choices, respectively.

Table 4.7: Color choices for bathroom

		First		Second		Third	
		No.	%	No.	%	No.	%
Valid	Red (FF0000)	24	14,9	18	11,2	14	8,7
	Yellow (FFFF00)	13	8,1	13	8,1	11	6,8
	Green (008000)	5	3,1	8	5,0	4	2,5
	Blue (0000FF)	18	11,2	10	6,2	16	9,9
	Purple (800080)	4	2,5	5	3,1	10	6,2
	Yellow-Red (E79400)	14	8,7	23	14,3	13	8,1
	Green-Yellow (ADFF2F)	16	9,9	**25**	**15,5**	25	15,5
	Blue-Green (0D98BA)	4	2,5	11	6,8	10	6,2
	Purple-Blue (730052)	5	3,1	14	8,7	10	6,2
	Red-Purple (E40078)	4	2,5	11	6,8	7	4,3
	White (FFFFFF)	**54**	**33,5**	23	14,3	**41**	**25,5**
	Total	161	100,0	161	100,0	161	100,0

Table 4.8: Emotions associated with the color choices for bathroom

		First		Second		Third	
		No.	%	No.	%	No.	%
	Calm	15	9,3	34	21,1	18	11,2
	Peaceful	3	1,9	4	2,5	1	,6
	Modern	35	21,7	**35**	**21,7**	**31**	**19,3**
	Relaxing	24	14,9	22	13,7	24	14,9
	Simple	7	4,3	13	8,1	23	14,3
Valid	Energetic	4	2,5	6	3,7	2	1,2
	Warm	3	1,9	8	5,0	6	3,7
	Romantic	1	,6	3	1,9	6	3,7
	Enjoyable	1	,6	3	1,9	9	5,6
	Clean	**47**	**29,2**	19	11,8	28	17,4
	Pure	21	13,0	14	8,7	13	8,1
	Total	161	100,0	161	100,0	161	100,0

As a summary of the descriptive section of the color favorability and emotions, the white and red colors seem to be the most chosen finishes for modern, romantic and clean emotional perception. The second choice is mainly hybrid colors, which were mainly blue-green, yellow-red and green-yellow for the perceptions of relaxing, romantic and modern. Nonetheless, white is the color mainly chosen at the third choice with modern perception. Table 4.9 summarizes the results of the most chosen colors and emotions associated with each space.

Table 4.9: Colors and emotions summery for residential spaces

Space	Choice	First	Second	Third
Living Room	Color	White	Blue-Green	White
	Emotion	Modern	Relaxing	Energetic
Bedroom	Color	Red	Yellow-Red	White
	Emotion	Romantic	Romantic	Modern
Kitchen	Color	Red	Yellow-Red	White
	Emotion	Clean	Modern	Modern
Bathroom	Color	White	Green-Yellow	White
	Emotion	Clean	Modern	Modern

4.2. Statistical Analysis

In order to test the two main hypotheses of this study, a one-way ANOVA test is performed for the color choices in the different residential spaces using the gender factor. As shown from Table 4.10, the majority of the significance levels are above

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the confidence level of 0.05. Therefore, there is no significant difference between males and females in the choice for color for the different residential spaces with $p < 0.05$. Out of the twelve color choices, the first choices of the kitchen and the bathroom are the only instances with significant difference.

Table 4.26: One-way ANOVA test for color choice with gender as a factor

		Sum of Squares	df	Mean Square	F	Sig.
First choice for living room color	Between Groups	,001	1	,001	,000	,995
	Within Groups	2175,689	159	13,684		
	Total	2175,689	160			
Second choice for living room color	Between Groups	,583	1	,583	,066	,797
	Within Groups	1399,889	159	8,804		
	Total	1400,472	160			
Third choice for living room color	Between Groups	1,091	1	1,091	,102	,750
	Within Groups	1697,468	159	10,676		
	Total	1698,559	160			
First choice for bedroom color	Between Groups	28,669	1	28,669	1,999	,159
	Within Groups	2280,710	159	14,344		
	Total	2309,379	160			
Second choice for bedroom color	Between Groups	26,843	1	26,843	2,988	,086
	Within Groups	1428,200	159	8,982		
	Total	1455,043	160			
Third choice for bedroom color	Between Groups	4,865	1	4,865	,429	,514
	Within Groups	1805,110	159	11,353		
	Total	1809,975	160			
First choice for kitchen color	Between Groups	93,016	1	93,016	6,542	**,011**
	Within Groups	2260,623	159	14,218		
	Total	2353,640	160			
Second choice for kitchen color	Between Groups	,450	1	,450	,052	,820
	Within Groups	1373,786	159	8,640		
	Total	1374,236	160			
Third choice for kitchen color	Between Groups	10,879	1	10,879	,837	,362
	Within Groups	2067,543	159	13,003		
	Total	2078,422	160			
First choice for bathroom color	Between Groups	96,447	1	96,447	6,774	**,010**
	Within Groups	2263,901	159	14,238		
	Total	2360,348	160			
Second choice for bathroom color	Between Groups	2,832	1	2,832	,265	,607
	Within Groups	1697,988	159	10,679		
	Total	1700,820	160			
Third choice for bathroom color	Between Groups	,518	1	,518	,046	,831
	Within Groups	1805,743	159	11,357		
	Total	1806,261	160			

Table 4.11: One-way ANOVA test for color choice with culture as a factor

		Sum of Squares	df	Mean Square	F	Sig.
First choice for living room color	Between Groups	79,486	1	79,486	6,029	**,015**
	Within Groups	2096,203	159	13,184		
	Total	2175,689	160			
Second choice for living room color	Between Groups	,761	1	,761	,086	,769
	Within Groups	1399,711	159	8,803		
	Total	1400,472	160			
Third choice for living room color	Between Groups	10,059	1	10,059	,947	,332
	Within Groups	1688,500	159	10,619		
	Total	1698,559	160			
First choice for bedroom color	Between Groups	8,884	1	8,884	,614	,434
	Within Groups	2300,495	159	14,469		
	Total	2309,379	160			
Second choice for bedroom color	Between Groups	11,373	1	11,373	1,253	,265
	Within Groups	1443,671	159	9,080		
	Total	1455,043	160			
Third choice for bedroom color	Between Groups	14,293	1	14,293	1,266	,262
	Within Groups	1795,682	159	11,294		
	Total	1809,975	160			
First choice for kitchen color	Between Groups	66,068	1	66,068	4,592	**,034**
	Within Groups	2287,571	159	14,387		
	Total	2353,640	160			
Second choice for kitchen color	Between Groups	46,460	1	46,460	5,564	**,020**
	Within Groups	1327,776	159	8,351		
	Total	1374,236	160			
Third choice for kitchen color	Between Groups	,123	1	,123	,009	,923
	Within Groups	2078,299	159	13,071		
	Total	2078,422	160			
First choice for bathroom color	Between Groups	59,461	1	59,461	4,109	**,044**
	Within Groups	2300,887	159	14,471		
	Total	2360,348	160			
Second choice for bathroom color	Between Groups	25,499	1	25,499	2,420	,122
	Within Groups	1675,321	159	10,537		
	Total	1700,820	160			
Third choice for bathroom color	Between Groups	,002	1	,002	,000	,989
	Within Groups	1806,259	159	11,360		
	Total	1806,261	160			

Furthermore, on testing the variance of color choice with the cultural background as a factor between the Libyan and Turkish participants, the results of the one-way ANOVA test show no significant difference between the results of the two groups based on a 0.05 confidence level. However, there are three instances out of the twelve, which are the first and second color choices for the kitchen, and the first color choice for the bathroom, where the significance level are 0.034, 0.020 and 0.044, respectively.

4.3. Discussion

The descriptive results show that the first choice in all of the spaces were standard colors, i.e. white and red, which were mainly associated with modernity, romantic, and clean feelings. The second choices were chosen majorly from the hybrid colors with yellow and green mixtures. Nonetheless, the majority third choice was only the white color in all of the spaces, which was tied to an energetic and modern choice.

The choices of the colors based on the cultural differences show that some of the spaces had differences in their choices based on the factor between the Turkish and the Libyan groups. The ANOVA testing results (Table 4.11) have shown a difference between the Turkish and Libyan cultures for the first color choice for the living room, kitchen and bathroom, as well as the second color choice for the kitchen. The results of the research confim the literature viewpoints and findings in Neal et al. (2002), Hupka et al. (1997), Choungourian (1968), Saito (2015), and Babolhavaeji (2015), which all found the cultural background as an influencial factor affecting the color choice in the interior spaces. The findings of this study show that these differences are effectivly applicable to residentail spaces.

Furthermore, differences between the two genders were found in the color first choices for the kitchen and the toilet through an ANOVA testing in Table 4.10. The second and third choices did not show any significant difference at the 0.05 level, mainly due to the choice of hybrid colors or neutral colors such as white. There were major differences found in the literature with regard to the gender choice differences for colors generally and specifically in internal spaces. These results were found in

Dorcus (1926), Camgoz et al. (2002), Ou et al. (2004), Hurlbert and Ling (2012), Shinha et al. (1970) and others. Gelineau (1981) and Helson and Lansford (1970) have also confirmed the stability of these differences over time. Therefore, this study further confirms the findings of these studies, as well as shows that these differences apply to the residentail spaces.

5. CONCLUSION

In interior design, color is considered one of the most important elements that has many implications of the space and spatial perception, from an architectural point of view. Nonetheless, the impact of color in interior space is not limited to the design effects, but also psychological and emotional impacts that would subsequently impact the perceptions, emotions, and comfort of the space users. Therefore, there are several studies that confirmed these effects.

Furthermore, there are different scales of color, which can be used in internal space finish. Munsell color coding system is one of the popular systems that are used for their variety of hues and possibility of creating hybrid mixtures from the main ten colors. As a result, the Munsell color coding system is used in this research in order to create models of residential spaces, living room, bedroom, kitchen and bathroom, with different color finishes selected by the researcher.

Moreover, there are factors that have been reviewed through the literature to affect the choice of color in the interior design, including personality, age, gender and cultural background. In this study, eleven models with different colors are developed for each of the four main residential spaces. Thereafter, a questionnaire methodology is adopted in order to determine the different choices of the participants from the different models, as well as the associated emotions and feelings with the choice of the color for a certain space.

On testing the hypotheses through the results of the questionnaire, the outcomes are as the following:

- The first hypothesis states that there is no impact of difference in gender of the people on their preferences for the colors in the interior design of their residential building's rooms. Based on a one-way ANOVA testing, presented in Table 4.10, ten out of the twelve instances tested showed a significance level higher than confidence level $p < 0.05$. Therefore, this hypothesis can be accepted.

- The second hypothesis states that there is no impact of difference in cultural background of the people on their preferences for the colors in the interior design of their residential building's rooms. Based on a one-way ANOVA testing, presented in Table 4.11, nine out of the twelve instances tested showed a significance level higher than confidence level $p < 0.05$. Therefore, this hypothesis can be accepted.

For future work, other social, cultural and ethnic parameters can be tested for the choice of color, with different interior design elements such as shape, space and dimensions.

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APPENDIX 1 (QUESTIONNAIRE FORM & MODELS)

Questionnaire

This questionnaire is about color preference for interiors in residential buildings. It includes questions about the living room, bedrooms, kitchen and bathroom.

Age

☐ 15 - 24 ☐ 25 - 34 ☐ 35 - 44 ☐ 45 – 54 ☐ 55- Above

Gender

☐ Male ☐ Female

Nationality

☐ Turkey ☐ Libya ☐ Other

Occupation

☐ Student ☐ Engineer ☐ Doctor ☐ Employee ☐ Business ☐ Other

Please place the order of your most preferred colors for each room.

Table 1. Arrangement of favorite colors in the Living room.

	First	Second	Third
Living room			
Emotions that best describe your color preference			
Calm			
Peaceful			
Modern			
Relaxing			
Simple			
Dynamic			
Warm			
Romantic			
Enjoying			
Hygiene			
Pure			
Other			

Do you prefer another color for the Living room?

Table 2. Arrangement of favorite colors in the Bedroom.

	First	Second	Third
Bedroom			
Emotions that best describe your color preference			
Calm			
Peaceful			
Modern			
Relaxing			
Simple			
Dynamic			
Warm			
Romantic			
Enjoying			
Hygiene			
Pure			
Other			

Do you prefer another color for the Bedroom?

Table 3. Arrangement of favorite colors in the Kitchen.

	First	Second	Third
Kitchen			
Emotions that best describe your color preference			
Calm			
Peaceful			
Modern			
Relaxing			
Simple			
Dynamic			
Warm			
Romantic			
Enjoying			
Hygiene			
Pure			
Other			

Do you prefer another color for the Kitchen?

Table 4. Arrangement of favorite colors in the Bathroom.

	First	Second	Third
Kitchen			
Emotions that best describe your color preference			
Calm			
Peaceful			
Modern			
Relaxing			
Simple			
Dynamic			
Warm			
Romantic			
Enjoying			
Hygiene			
Pure			
Other			

Do you prefer another color for the Bathroom?

Internal perspective bedroom

Figure.1.Red Color. #FF0000

Figure .2.Bedroom yellow color. #FFFF0

Figure .3. Bedroom Green color. #008000

Figure 4. Bedroom Blue color. #0000FF

Figrue.5 .Bedroom Purple color. #800080

Figure .6 .Bedroom yellow –Rad. #E79400

Figure .7. Bedroom Green-Yellow color. #ADFF2F

Figure .8. Bedroom Blue – Green color. #0D98BA

Figure.9 .Bedroom Purple- Blue color. #730052

Figure .10.Bedroom Rad- purple color. #E40078

Figure.11. Bedroom White color. #FFFFFF

Internal perspective of Living room

Figure .1.Living room Red color. #FF0000

Figure .2.Living room yellow color. #FFFF00

Figure .3. Living room Green color. #008000

Figure .4. Living room Blue color. #0000FF

Figrue.5 .Living room Purple color. #800080

Figure .6 .Living room yellow –Red. #E79400

Figure .7. Living room Green-Yellow color. #ADFF2F

Figure .8. Living room Blue – Green color. #0D98BA

Figure.9 .Living room Purple- Blue color. #730052

Figure .10.Living room Red- purple color. #E40078

Figure.11. Living room White color. #FFFFFF

Internal perspective of Kitchen

Figure .1. Kitchen Red color. #FF0000

Figure .2. Kitchen Yellow color. #FFFF00

Figure .3. Kitchen Green color. #008000

Figure .4. Kitchen Blue color. #0000FF

Figure .5. Kitchen Purple color. #800080

Figure .6. Kitchen Yellow- Red color. #E79400

Figure .7. Kitchen Green- Yellow color. #ADFF2F

Figure .9. Kitchen Purple -Blue color. #730052

Figure .8. Kitchen Blue – Green color. #0D98BA

Figure .10. Kitchen Rad -Purple color. #E40078

Figure .11. Kitchen White color. #FFFFFF

Internal perspective of Bathroom

Figure .1. Bathroom Red color. #FF0000

Figure.2. Bathroom Yellow color. #FFFF00

Figure.3. Bathroom Green color. #008000

Figure.4. Bathroom Blue color. #0000FF

Figure.5. Bathroom Purple color. #800080

Figure .6. Bathroom Blue - Green color. #0D98BA

Figure.7. Bathroom Yellow – Rad color. #E79400

Figure.8.Bath room Green Yellow color. #ADFF2F

Figure. 9. Bathroom Purple - Blue color. #730052

Figure.10. Bathroom Red – Purple color. #E40078

Figure.11. Bathroom White color. #FFFFFF

APPENDIX 2 (GRAPHS OF COLORS AND EMOTIONS)
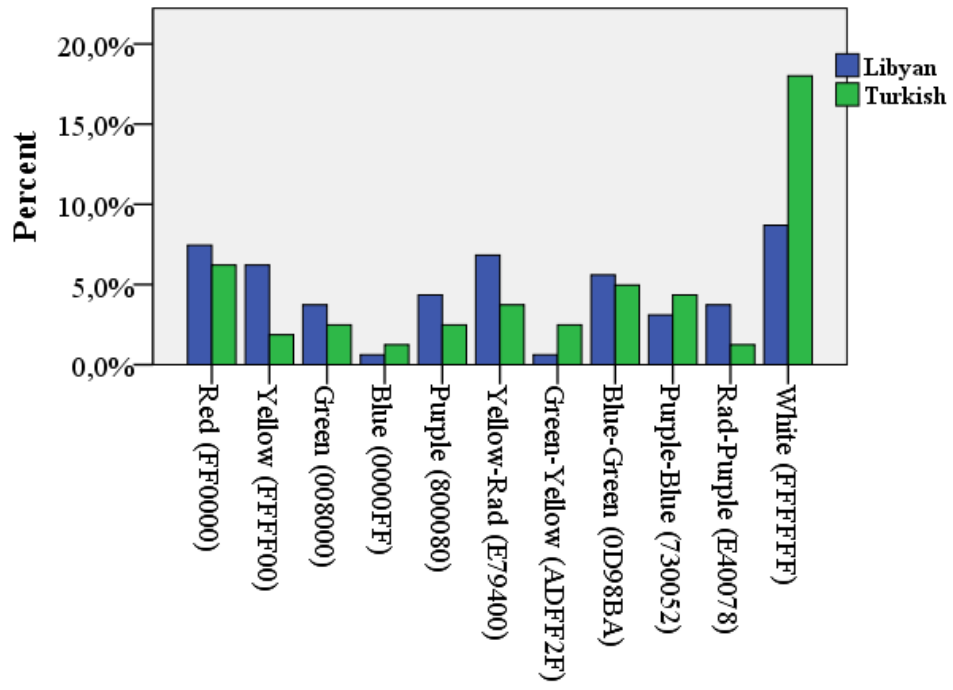
Color

First choice for living room color
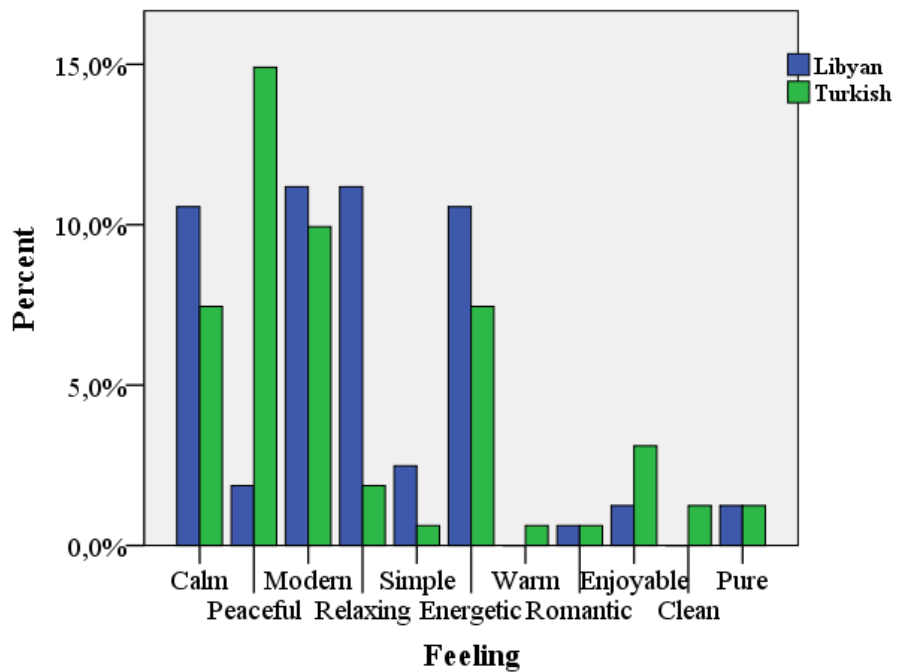
Feeling

Feeling for first choice for living room color
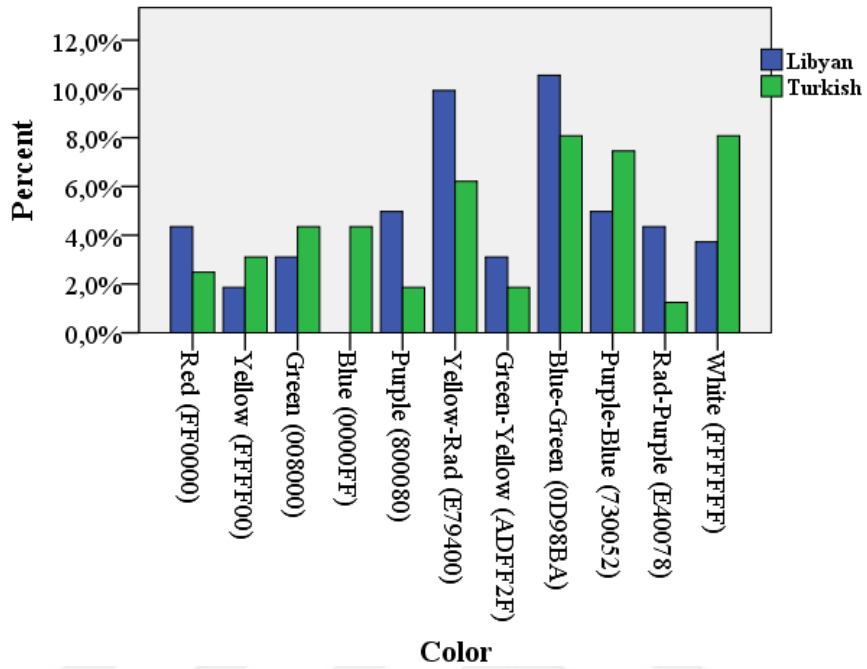
Second choice for living room color
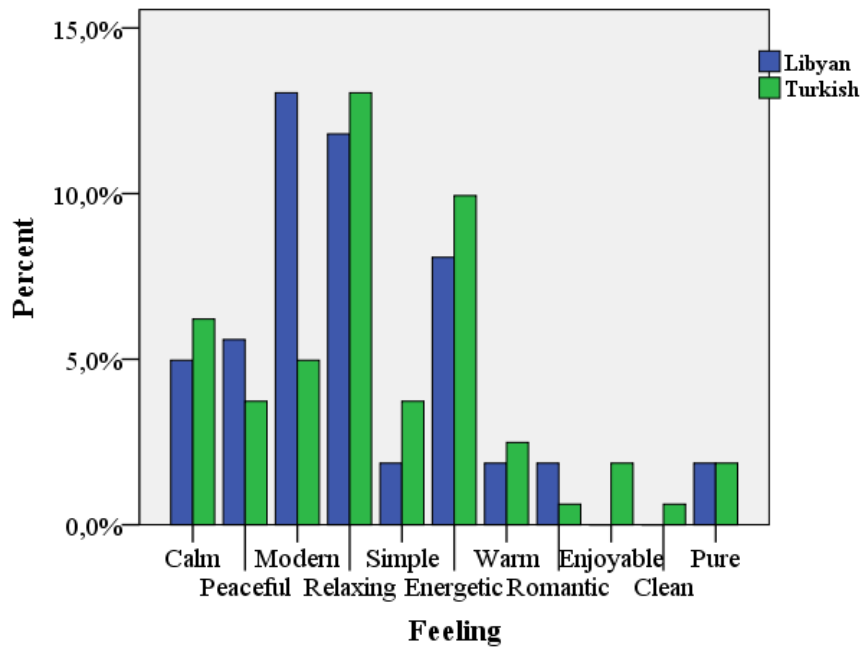
Feeling for second choice for living room color
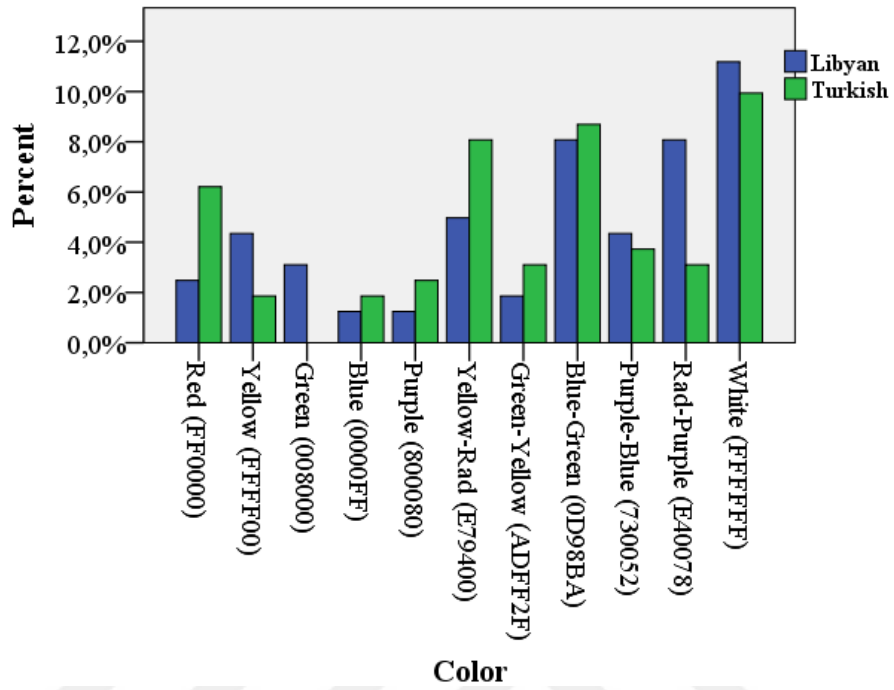
Third choice for living room color
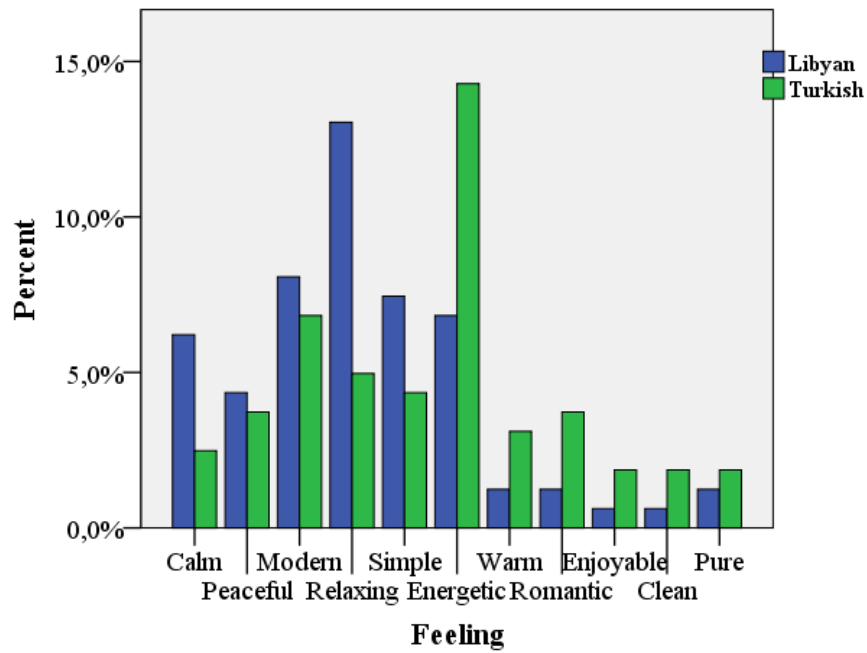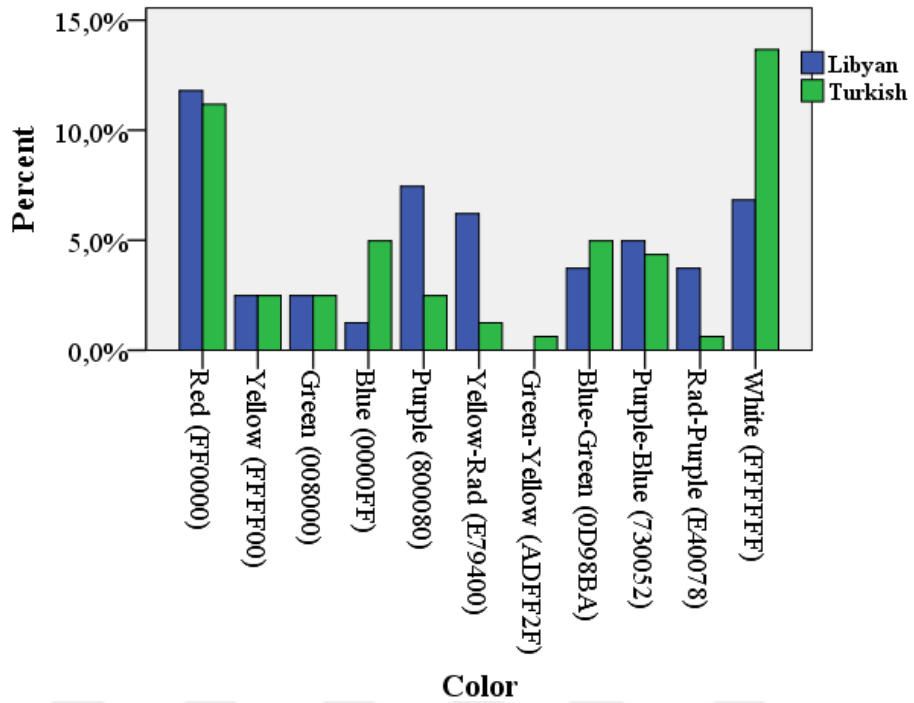
Feeling for third choice for living room color

Color

First choice for bedroom color
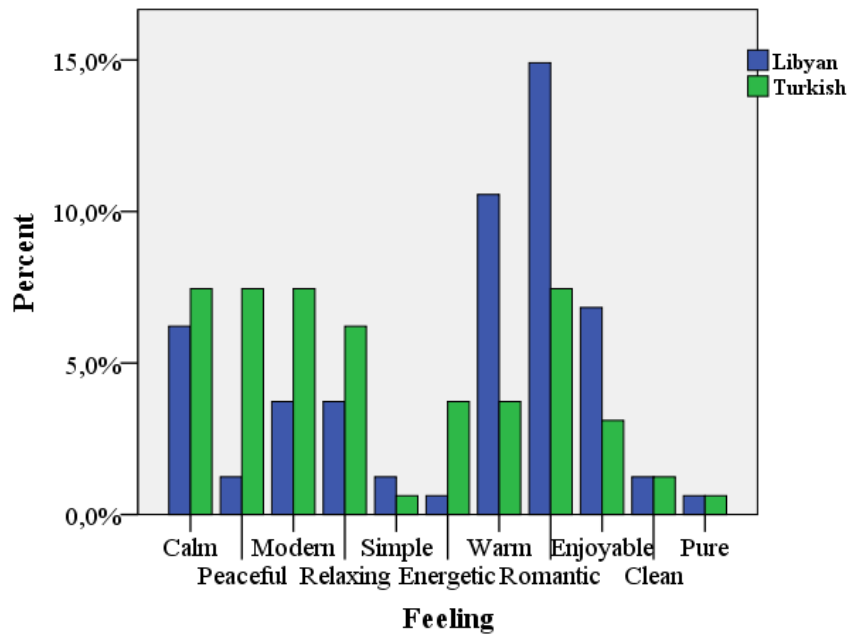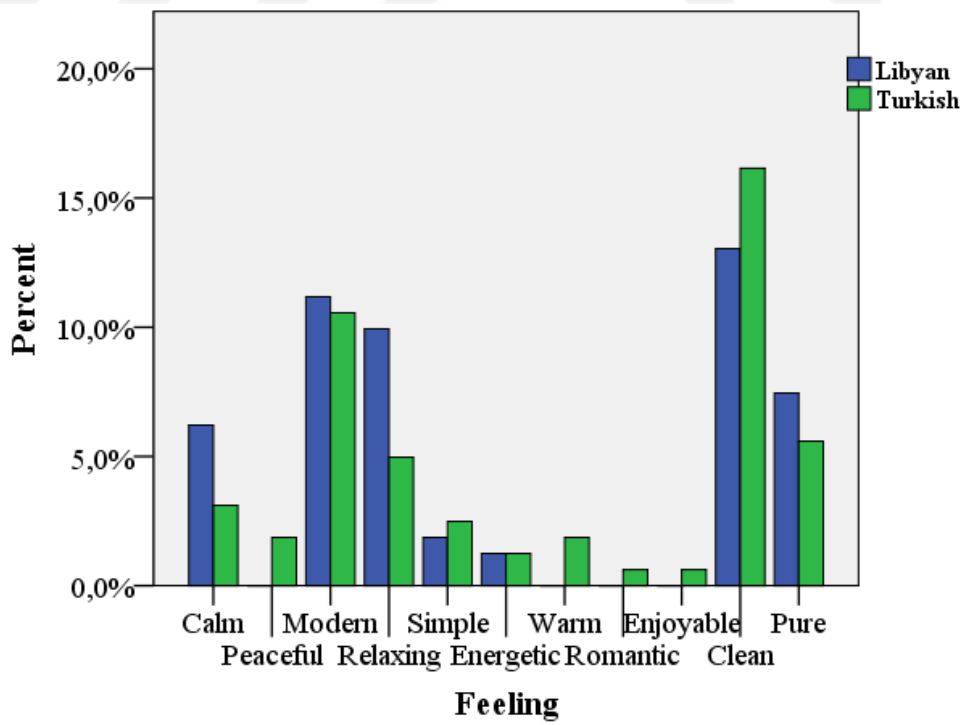

Feeling

Feeling for first choice for bedroom color

Second choice for bedroom color

Feeling for second choice for bedroom color

Color

Third choice for bedroom color
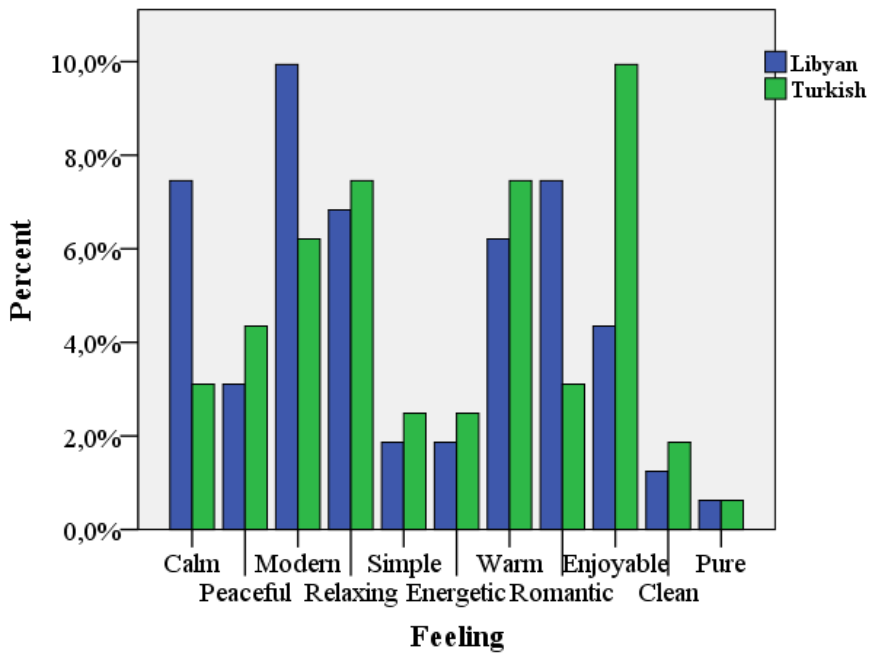
Feeling

Feeling for third choice for bedroom color
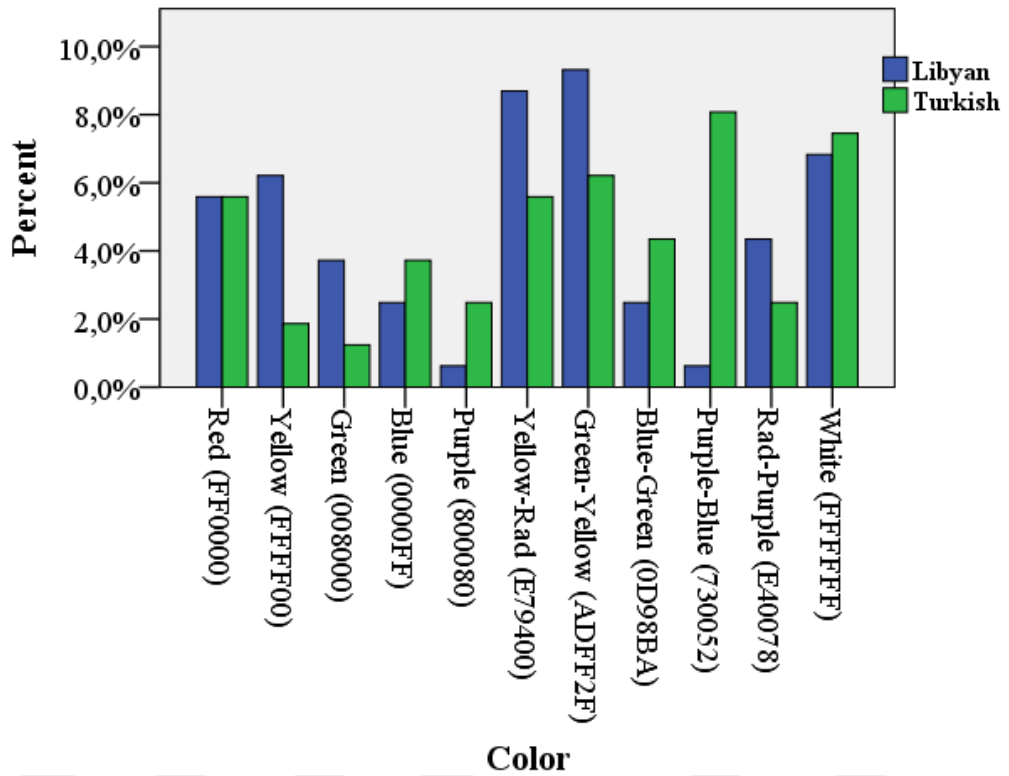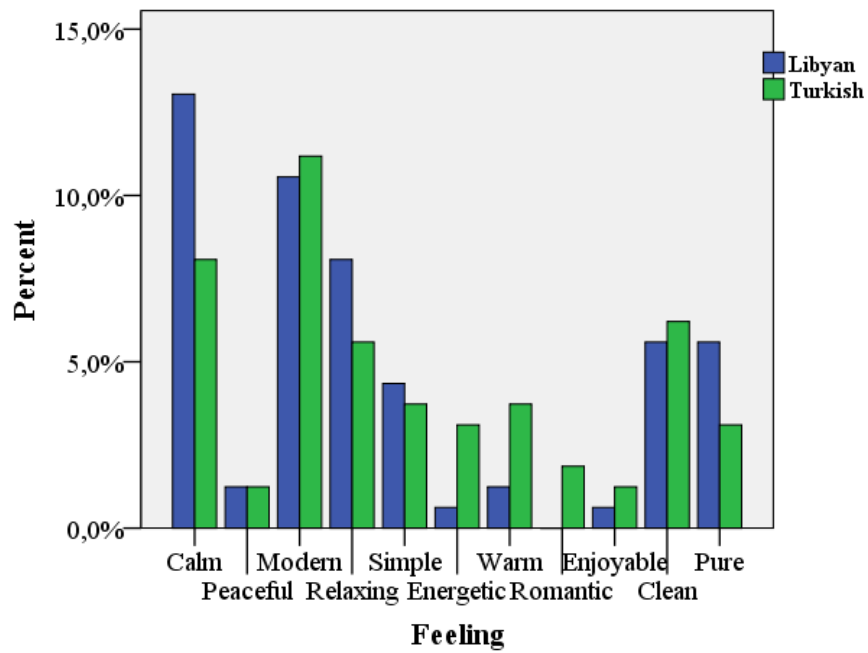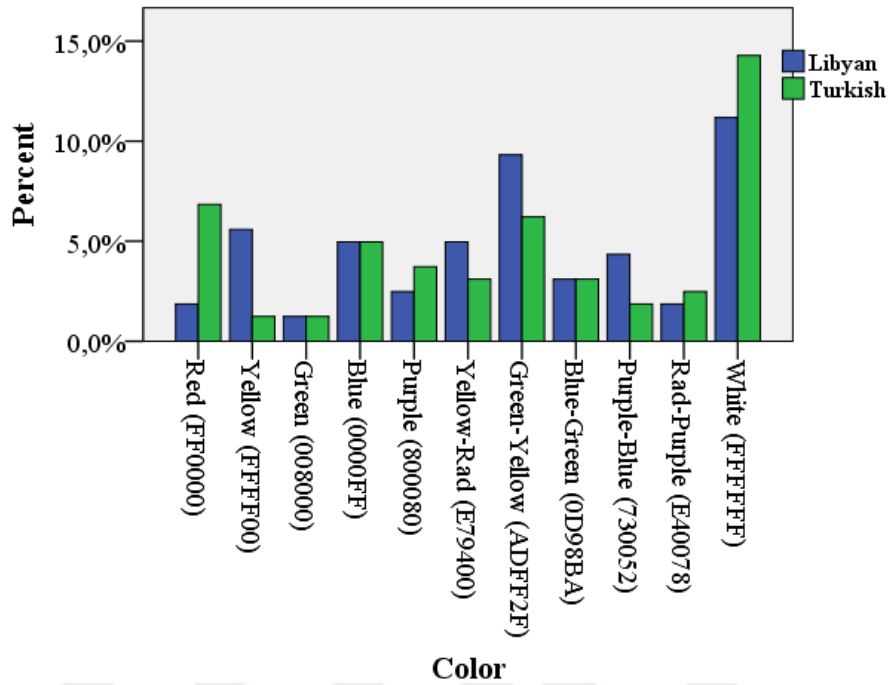
Color

First choice for kitchen color

Feeling

Feeling for first choice for kitchen color

Second choice for kitchen color
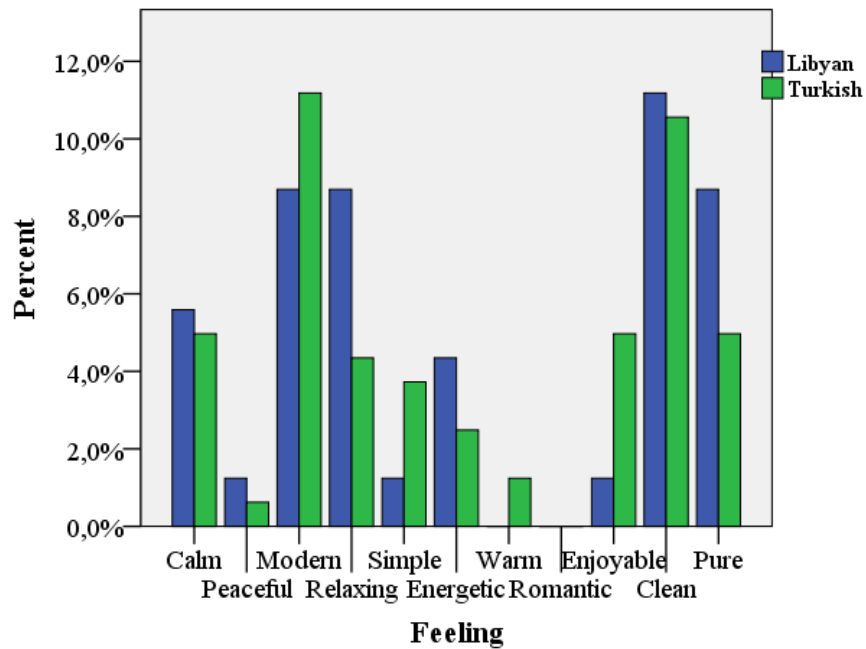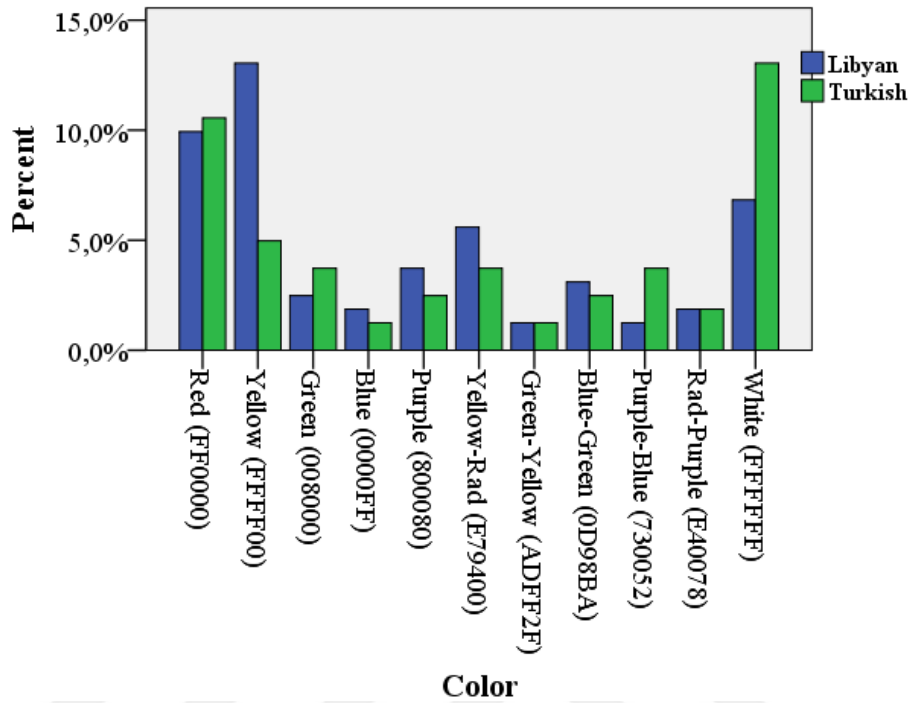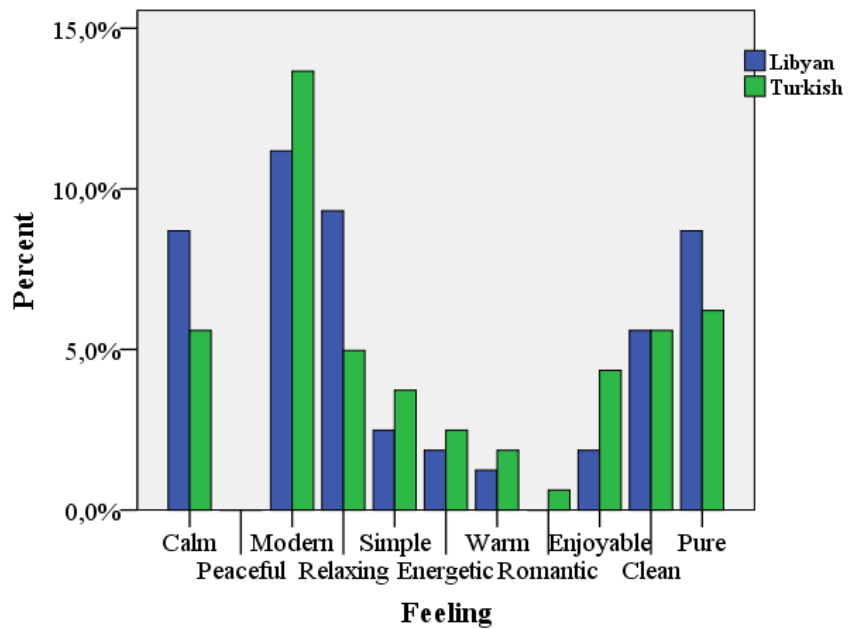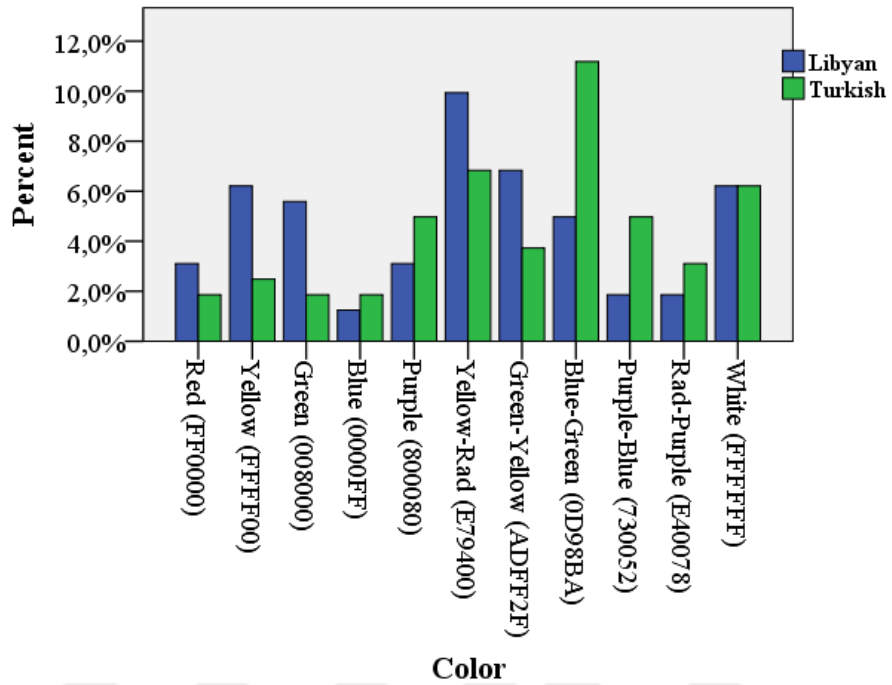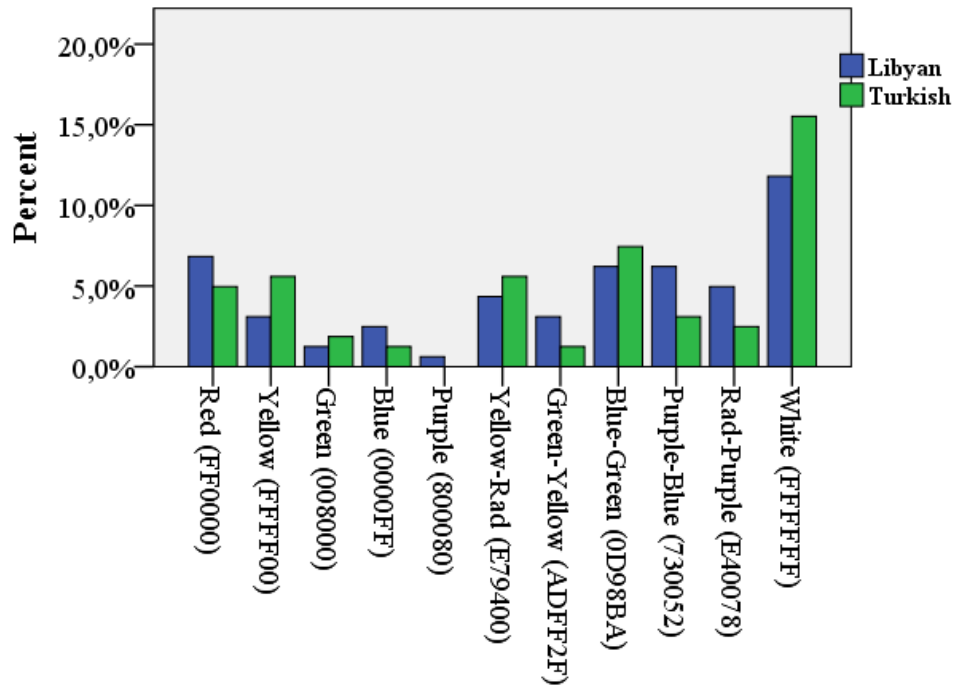
Feeling for second choice for kitchen color
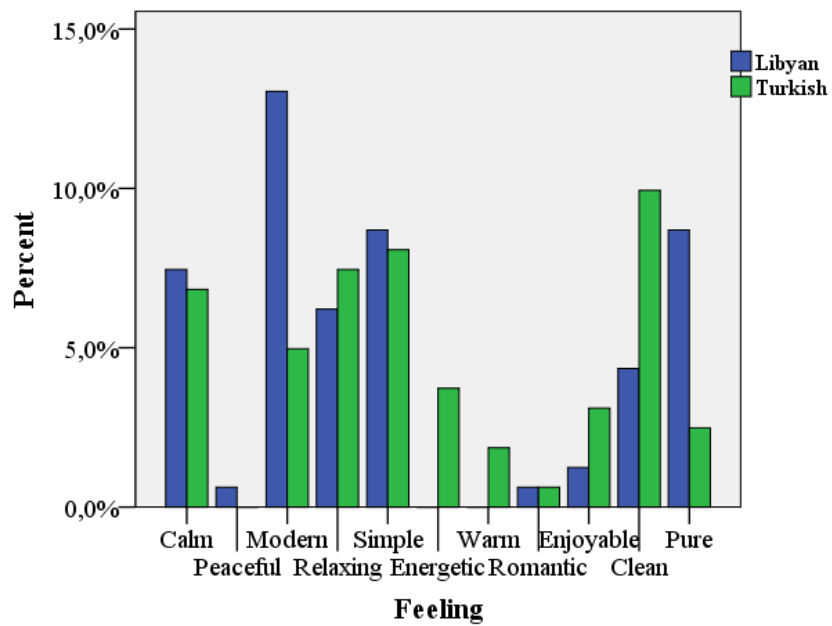
Third choice for kitchen color

Feeling for third choice for kitchen color

First choice for bathroom color

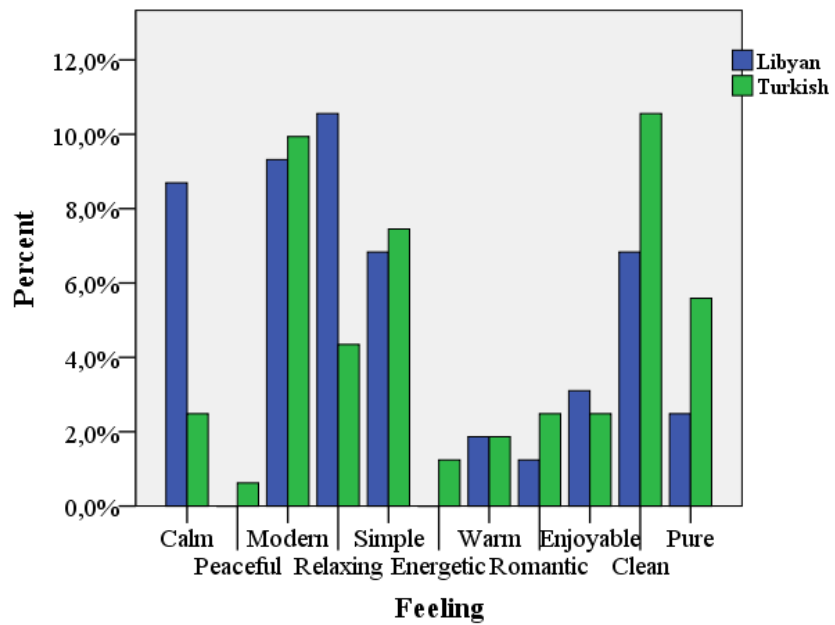

Feeling for first choice for bathroom color

Second choice for bathroom color

Feeling for second choice for bathroom color

Color

Third choice for bathroom color

Feeling

Feeling for third choice for bathroom color