



## Assessment of Spatial Factors Influencing User Satisfaction in Quick-Casual Restaurants

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### ABSTRACT

Users' evaluations of the restaurant environment are influenced by various design factors and their level of satisfaction and comfort, of which colour is an essential component. Several studies in the literature have demonstrated the influence of colour in interior design on human behaviour and psychology in various contexts. This study investigates the spatial factors influencing users' satisfaction in quick-casual restaurants. User satisfaction was measured using four major elements: product, service, price, and physical environment. This study used a questionnaire to assess user satisfaction in four quick-casual restaurants in Ankara, Turkey. The emphasis on colour effects was intended to evaluate the physical environment of the restaurants. The study results, which included the participation of 120 restaurant users, show that participants rated the various restaurant environments in a variety of ways. The assessments provided by the participants are statistically tested for significant differences based on gender, frequency of restaurant usage, and colour properties for both user satisfaction and the evaluation of the physical environment using one-way between groups of variance (ANOVA) ( $p < 0.05$ ). The findings show that demographics have a limited influence on restaurant user satisfaction, though it varies depending on colour properties. Additionally, the results suggest that the environmental colours of quick-casual restaurants significantly influence user satisfaction, overall satisfaction levels, and the evaluation of the physical environments.

**Keywords:** colour, restaurant design, environmental colour perception, user satisfaction, quick-casual restaurants

### 1 INTRODUCTION

Interior design elements influence the perception, satisfaction, and comfort of users. Research indicates that physical environments influence users' psychological, social well-being and behaviour in that environment. The interior design elements form the atmosphere of various interior environments, including restaurants, which make their environment complex due to their variety. In restaurant spaces, several factors influence the dining experience and user satisfaction, including the quality of the product and the service, price, as well as the physical environment and the interior design of the space (Butt & Murtaza, 2011). The literature confirms the impact of the physical environment of the restaurants on user satisfaction, which is one of the three major influencers in restaurants, along with food, service and price (Ryu & Han, 2010). The primary focus of the studies on the interior design elements of dining spaces is to investigate the influence on user perception and satisfaction. Thus, various types of physical environments of restaurants are explored concerning user satisfaction levels measured in various studies. Comfort, layout, furniture design, and colour and lighting are thought to be some of the most influential factors in interior design (Pecotic et al., 2014; Almohaimmeed, 2017). Additionally, many studies show that colour is one of the most critical factors influencing user satisfaction (Pecotic et al., 2014; Almohaimmeed, 2017; Tüzünkan & Albayrak, 2016). Some studies even found a link between colour, appetite, and diner mood (Bhatia, 2003).



Colour is one of the most apparent interior design characteristics that has been studied in various contexts. Understanding the concept of colour and how it may influence users' experiences in interior spaces is the main point in any colour study. This study conducted a comprehensive literature review to understand the relationship between the interior design elements, particularly colours in restaurants, and restaurant user satisfaction levels. Additionally, a case study was conducted in four quick-casual restaurants to understand user satisfaction regarding food, service, price, and physical environment, emphasising the most significant specific interior design elements. This study also intended to determine the relationship between the various design elements and the other indicators.

### 1.1 Interior Design Elements

Spatial factors that influence the conditions of the interior spaces allows designers to account for the needs and perceptions of the users. Furthermore, numerous classifications and viewpoints regarding the elements and their types must be considered when designing an interior space. Some studies believe that spatial design elements, such as amenity, efficiency, health and safety, are essential, while others consider that the physical properties, such as size, shape, finishes and furniture, are crucial. In addition, Lee et al. (2017) state that colour and lighting are significant factors to consider as physical properties of interior space. Evans et al. (1996) claim that the internal layout of the space is one of the most influential factors in determining user satisfaction and comfort, particularly in public areas.

**Table 1.** Interior Design elements and relationships (Abdulpader et al., 2014, pp. 206-209)

Interior Design Element	Description
Shape and Background	Defining the identity of the space by forming shape legibility, which can be achieved by contrasting the elements placed with the interior environment and the backgrounds surrounding the space.
Continuity	Maintaining the same theme throughout the interior space creates visual comfort and acceptance, which can be achieved using the same colours, shapes, patterns, and textures.
Repetition	An interior space gains flexibility by repeating its components and design patterns.
Sequence	Changes in continuity should be introduced gradually between the various sections of the interior environment, as a visual shock may increase the intensity of the space.
Rhythm	The elements that comprise the interior space can be repeated to create a theme or a dominant rhythm that contributes to the visual comfort of the space.
Dominance	Certain elements within the interior environment can be highlighted using visually appealing colours.
Similarity	Axes are identified within the interior space to create reflection or symmetrical effects, and interior design elements can be placed around them to create order and legibility.
Proportion	The size relationships between the various interior space elements can form the design theme. The size proportion between the users and the design elements also significantly impacts the users' perception.



The elements of the interior environment are classified into two types: physical and spatial. Physical properties are those concerned with the overall elements of the interior environment, such as space dimensions, thermal and visual comfort. The spatial environment is evaluated based on the elements, such as size, number, and shape of the elements and aesthetical factors within the environment. Besides physical and spatial characteristics, Table 1 describes eight major interior design elements that are identified through interior design spaces: shape and background, continuity, sequences, repetition, rhythm, dominance, similarity, and proportion (Abdulpader et al., 2014).

Interior design elements can influence how users perceive a space. Changing a few properties can make the space appear larger or smaller. Colour is an essential interior element that influences the distribution and reflection of lighting throughout the interior environment (Al-Zamil, 2017). Lighter colours increase the spaciousness of the space, while dark colours decrease it. The geometry of the space affects where a person sees its limits and borders; therefore, the shape of the space has an impact on space perception. Furthermore, the higher the ceiling and the more volume incorporated into the space, the more spacious the users perceive the space to be. The lines that form the various components of the interior space play a significant role in determining how users perceive the space. Straight lines reflect rigidity and create a perceived narrower space, whereas curved lines create a more flexible and spacious design (Al-Zamil, 2017).

### **1.2 Human Interface in Interior Environments**

Individuals' perceptions of design elements differ from one another. One person may consider the interior environment comfortable, spacious, or relaxing, whereas another may consider it uncomfortable, narrow, and stressful. Cultural and social values and experiences, as well as physical and environmental factors, all influence how a person interacts with their surroundings.

Age determines a person's generation and life experiences over time, whereas the place of living has several factors that affect space perception, such as building complexities, furniture types, and the types of buildings encountered. Personal behaviour is also influenced by social and cultural norms; concepts such as personal space and privacy influence how a person feels in a particular environment. Therefore, various factors can affect how the interior environment is perceived (Mahmoud, 2017). There is no doubt that the different design elements impact the psychological status of the users. According to Petermans and Pohlmeier (2014), a positive interior design can increase the pleasure of users and the meaningfulness of their experience within the space. They argue that the interior environment imposes two types of interaction and well-being styles: objective and subjective. The goal is mainly associated with static environments designed to meet basic needs and have passive user roles.

Nonetheless, personal well-being emerges from dynamic environments that meet higher-order needs and interact with users. The study examined a positive design framework that simulates human flourishing. The framework is based on three primary design goals, which are as follows (Petermans & Pohlmeier, 2014):

- Designing for virtue: for morally good reasons
- Designing for pleasure: imposing positive effects on users
- Designing for personal significance: aligned with pursued personal goals

The aesthetics of various design elements influence individual perceptions. Smooth surfaces reflect cleanliness and tidiness in any environment, whereas rougher surfaces reflect rigidity and durability (Felming, 2014). Furthermore, Felming (2004) found that furnishings in a space and an increase in furniture scale reduce the perception of interior space. Furniture with larger surface areas alters the perception of spatial dimensions such as height and width (Von Castell et al., 2014).



## **2 INFLUENCE OF COLOUR in RESTAURANTS**

### **2.1 Psychological Influences**

Many studies on colour focused on the psychological influences that are related to behaviour and emotions. Nonetheless, some studies have evaluated the impact of colour on physiological performance, body and mind. Colour has been shown to be one of the most influential interior design factors on human cognitive, affective, and behavioural aspects. However, several factors influence how a person perceives a colour or its nuances. Gender and age differences and cultural background are all personal factors that influence. The context of colour within a specific environment also affects how users perceive it (O'Connor, 2015). Furthermore, interior lighting directly impacts how objects are perceived in size, texture, position, shape, and colour—the various properties reflected from a coloured object influence the perception of comfort, relaxation, and spaciousness. A study of different lighting properties reflected on coloured objects revealed that lighting with higher illuminance on coloured objects simulated better visual comfort and spaciousness, while lighting with lower illuminance simulated more relaxation. Such findings can be used to demonstrate the effect of lighting on colour and the impact of colour on space perception, and the psychological status of space users (Manav, 2013).

A study that experimented with three types of coloured light (red, green, and white) on 97 participants and their perception of an interior space found no significant difference between the participants based on the pleasantness factor. Nonetheless, responses to the questionnaire revealed that the interior space appeared more aesthetically appealing in the red and green colours than in the white colour, while the white colour was indicated to create a more functional interior space than the red and green colours. Participants found the interior space to be less comfortable in the red colour condition than in the green and white conditions, while the more spacious effect was found to be greater in the white colour condition (Odabasioglu, 2009). In reviewing the literature covering the impact of colour on human behaviour between 1964 and 2011, 40 studies were conducted in simulation environments (laboratories) or office/workplace environments (Jalil et al., 2012). Only one study was conducted in a restaurant setting, and it used a non-performance method to assess the environment. This demonstrates a lack of data available to compare results in the literature in restaurant contexts. However, other studies were conducted in different environments using actual or made-up contexts to simulate the actual conditions of the desired environments. The assessment methods varied between six main types: environmental assessment, psychological, physiological, performance, non-performance and observational assessment. The results of these studies can also be used to understand the psychological and physiological impacts of colour, although there are very few studies that address these effects in the restaurant context (Jalil et al., 2012).

Other researchers investigated the effects of colour on the psychological behaviour of humans in a variety of contexts. In educational contexts, purple and blue colours were found to simulate better attention in the classroom when compared to other colours such as red, yellow, and green, where the comparison was measured using an academic performance test (Duyan & Unver, 2016). In counselling rooms, dark colours were found to simulate more pleasant, interesting, exciting, and relaxing effects; however, using other colours, such as red, purple, blue and pink, increased the sense of safety (Lui et al., 2014). The findings of such studies confirm the psychological effects of colour depending on the context of the interior space. As a result, despite the few studies conducted in this context, similar results can be found within restaurants.

### **2.2 Personal Preferences**

A study by Wardono et al. (2012) used a simulation of a restaurant environment to evaluate three main criteria: colour, lighting, and décor. The study tested two colour conditions (monochromatic and complementary colour scheme), two lighting conditions (bright and dim) and two décor conditions (elaborate and plain). The six different conditions were combined to create eight different interior space environmental conditions.



Three factors were evaluated in 162 participants: sociability, emotion, and behaviour. The one-way ANOVA statistical analysis found no significant difference between the eight interior environment conditions when dining with friends. However, when dining with a special friend, monochromatic colour schemes in the interior space, dim lighting, and plain décor were significantly different from the other cases. This case produced similar results in terms of emotions and behaviour. Compared to other results, the exact condition resulted in more positive perceptions and higher efficiency (Wardono et al., 2012).

In a restaurant context, a study by Söker (2009) investigated the effect of colour on user assessment, evaluation of restaurant quality, colour-based user choice, and evaluation of restaurant atmosphere. A questionnaire was designed to study the four research points with 96 participants in three restaurants in Ankara. The results show that most participants preferred the brown restaurant atmosphere, followed by the red restaurant atmosphere. Furthermore, warm colours were preferred by approximately 80% of participants over cool colours. Nonetheless, no significant differences in colour preference were discovered based on restaurant type or time spent in the restaurant. Furthermore, differences in colour preference were discovered based on price range and gender (Söker, 2009).

### **3 METHOD**

#### **3.1 Aim and Research Questions**

This study aims to investigate the spatial factors influencing users' satisfaction in quick-casual restaurants. The study includes several interior design elements; however, the main architectural elements were considered colour and the restaurants' overall theme. Accordingly, a questionnaire was presented to the participants, and the following research questions were addressed based on the research objectives.

1. Are there any gender differences in user satisfaction, overall satisfaction, and evaluation of the restaurant physical environment?
2. Is there a statistically significant difference in physical environment evaluation based on restaurant usage frequency?
3. Are there any significant differences in user satisfaction, overall satisfaction, and physical environment evaluation based on restaurant environmental colour design?

#### **3.2 Quick-Casual Restaurants**

Four quick-casual restaurants were chosen for the study: i) Acar Pide & Kebap, ii) Ciğerci Yakup, iii) Hoşdere Kebap, and iv) Şampiyon Dönercisi. The restaurants were chosen based on customers' frequent usage and the differences in their interior environments. All of the restaurants are located in Ankara, Turkey. The cuisine selected for all the restaurants was similar (i.e., Turkish kebab cuisine) to focus the study's primary attention on the physical environment. Nonetheless, the other aspects of user satisfaction are also considered part of this study. Acar Pide and Kebap, located in Dikmen, was the first restaurant. The restaurant has a simple interior design and layout, with red and white being the most prominent colours. Ciğerci Yakup, located in Dikmen, was the second restaurant. The restaurant has a classic furniture design with a modern interior, with white, black, and brown as the dominant colours. Hoşdere Kebap, located in Ayrancı, was the third restaurant. The restaurant has a modern design with brown and white dominant colours. Şampiyon Dönercisi, located in Keçiören, was the fourth restaurant. The interior's dominant colours are red, black, and brown.

#### **3.3 Participants**

The participants were chosen at random from the restaurant users, focusing on adults over 18 and an equal gender representation in the sample. Nonetheless, each restaurant took special care to collect nearly equal samples of males and females. The same precautions were taken to ensure that all ages participated in the study. These measures were primarily employed to answer the research questions. A total of 120 restaurant users participated in the study. There were 50 per cent males and 50 per cent females, for a total of 60 males and 60 females. The even distribution of the sample ensures that the analysis based on



gender differences and correlations includes an equivalent dependent variable. Participants were also asked to indicate their age group. The majority of participants were between the ages of 24 and 40. A normal sample distribution within the age groups allows for a reliable statistical analysis. Furthermore, the results of the education level showed a normal distribution. When asked how often they visit restaurants, 21.67 per cent of the participants indicated they visit restaurants daily, 30.83 per cent a few times a week, and 34.17 per cent a few times a month.

### 3.4 Measures and Procedure

The study was based on a thorough understanding of quick-casual restaurants' interior design themes, colours, and interior design elements to facilitate their relationship with user satisfaction. A questionnaire was used as part of a subjective evaluation by restaurant users. The main elements that were proven through the literature in measuring user satisfaction were used in the questionnaire design, while the analysis was based on findings from the architectural analysis and the questionnaire results. This methodology allows the researcher to assess user satisfaction while focusing on the physical environment of the space. Based on indicators supported by the literature (Ghimire, 2012; Tüzünkan and Albayrak, 2016), the research investigates how specific indicators may impact user satisfaction and satisfaction from the physical environment.

The primary methodology used in this study is a questionnaire methodology, which resulted in creating the questionnaire form. The scale used to assess the physical environment and user satisfaction was based on scales developed by several studies; however, the scale was close to those produced by Tüzünkan and Albayrak (2016) and Ghimire (2012). Questionnaires were collected throughout the restaurants' working hours. Participants filled out the questionnaires in 10 to 15 minutes. The questionnaire was divided into five major sections, which are as follows:

- **Demographics and restaurant usage:** information gathered included gender and frequency of visits to the chosen quick-casual restaurants and restaurants in general.
- **Colour description:** the participants were requested to describe the restaurants' colour based on dominant colour. Eleven colours were provided for multiple selections based on the main colour hues found in interior environments. Furthermore, on a 7-point Likert scale from low to high, participants were asked to describe the restaurant's colours based on colour properties such as brightness, purity, and reflection.
- **Evaluation of user satisfaction:** ten indicators were rated on a 7-point Likert scale ranging from low to high. The indicators were: food taste, portion size, food presentation, utensil cleanliness, food freshness, restaurant food variety, employee neatness, employee communication, service, and price.
- **Physical environment evaluation:** twenty indicators were rated on a 7-point Likert scale ranging from low to high. The indicators were: aesthetics and facility, furniture cleanliness, colour attractiveness, colour suitability for restaurant theme, furniture quality, painting and pictures, wall decoration attractiveness, restaurant layout, space spaciousness, privacy level, size and shape of layout, the comfort of movement, ambience, temperature comfort, scent pleasantness, background music, noise level, table arrangement, table covers and lighting.
- **Overall satisfaction:** two significant aspects of user satisfaction were requested to be rated on a 7-point Likert scale ranging from strongly dissatisfied to strongly satisfied. The first aspect was the product, service, and price, while the second was the physical environment.

The procedure started with a brief introduction for the participants, describing the questionnaire and reviewing the sections to ensure that they understood all of the questions. Uncertainties were addressed in response to participant questions. The study's



target sample was 120 participants, evenly distributed across four quick-casual restaurants.

### 3.5 Data Analysis

All data were statistically analysed using IBM SPSS Statistics version 24. The data were checked for normality, indicating that the results showed that the data were not normally distributed (sig. = 0.000,  $p < 0.05$ ). The analysis was performed to ensure that a minimum of 0.7 Cronbach's Alpha is acceptable for social science research (Taber, 2017). The overall reliability of the questionnaire was evaluated. Furthermore, descriptive statistics and statistical analysis using one-way between groups of variance (ANOVA) were provided. The statistical testing results research were answered the research questions, and the findings were included in the study's conclusions.

### 4 RESULTS

Following the data collection procedure, the four quick-casual restaurants returned 120 questionnaires. Reliability analysis was carried out to ensure that the survey design and sample size were adequate, and Cronbach's alpha was calculated to be 0.90. Cronbach's alpha for the user satisfaction scale was 0.83, while the physical environment evaluation scale was 0.91. The results were deemed reliable because all indices were greater than 0.7. ANOVA was performed for gender differences, restaurant visiting frequency, and colour properties estimated by participants to highlight the significant differences in user satisfaction and satisfaction from the physical environments at the case studies. These statistical analyses aid in the testing of research questions. The gender differences were tested with a confidence level of 95%, and the results of ANOVA show that the gender differences were statistically significant at the  $p < 0.05$  level in only food representation ( $F [1, 118] = 4.23, p = 0.042$ ). This suggests that the food representation of the restaurants influences the overall satisfaction level in terms of gender differences. In addition, Table 2 shows the ANOVA results for three of the twenty physical environment indicators that were statistically significantly different. Gender differences in furniture cleanness, painting and picture, and table arrangement were found to be significant at the  $p < 0.05$  level in the results of the restaurant's physical environment indicators.

**Table 2.** One-Way ANOVA results based on gender differences in the evaluation of restaurant physical environment

		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
Furniture cleanness	Between Groups	11.408	1	11.408	8.846	<b>.004</b>
	Within Groups	152.183	118	1.290		
	Total	163.592	119			
Painting and picture	Between Groups	6.533	1	6.533	4.072	<b>.046</b>
	Within Groups	189.333	118	1.605		
	Total	195.867	119			
Table arrangement	Between Groups	8.533	1	8.533	5.574	<b>.020</b>
	Within Groups	180.633	118	1.531		
	Total	189.167	119			

Again, ANOVA was conducted to explore whether there was a significant difference in restaurant usage based on user satisfaction and restaurant physical environment

indicators. The results show that there were no statistically significant differences among the twelve indicators. Thus, this indicates that the user satisfaction indicator and overall satisfaction levels on the quick-casual restaurants were not statistically significant in terms of restaurant usage frequency. Similarly, no significant differences were found in the twenty physical environment indicators based on quick-casual restaurant usage.

Furthermore, ANOVA was used to test for significant differences in user satisfaction based on the participants' assessments of colour properties in terms of brightness, purity, and reflection. Tables 3 displays the ANOVA results for user satisfaction for colour properties. The majority of the indicators showed significant differences in colour brightness, colour purity, and colour reflection, except for utensils cleanness for all parameters and restaurant food variety for colour purity. Therefore, this finding suggests that environmental colour parameters in quick-casual restaurants significantly influence user satisfaction and overall satisfaction levels.

**Table 3.** One-Way ANOVA results based on colour brightness, colour purity, and colour reflection descriptions in terms of user satisfaction

User satisfaction factor	Colour brightness	Colour purity	Colour reflection
Food taste	$F(6, 113) = 11.98$ $p = 0.000$	$F(5, 114) = 4.51$ $p = 0.001$	$F(6, 113) = 3.50$ $p = 0.004$
Portion size	$F(6, 113) = 4.05$ $p = 0.001$	$F(5, 114) = 6.08$ $p = 0.000$	$F(6, 113) = 2.99$ $p = 0.009$
Food representation	$F(6, 113) = 5.64$ $p = 0.000$	$F(5, 114) = 7.35$ $p = 0.000$	$F(6, 113) = 8.20$ $p = 0.000$
Food freshness	$F(6, 113) = 5.45$ $p = 0.000$	$F(5, 114) = 6.53$ $p = 0.000$	$F(6, 113) = 5.19$ $p = 0.000$
Restaurant food variety	$F(6, 113) = 2.35$ $p = 0.036$	-	$F(6, 113) = 2.91$ $p = 0.011$
Employee's neatness	$F(6, 113) = 7.55$ $p = 0.000$	$F(5, 114) = 4.78$ $p = 0.001$	$F(6, 113) = 4.81$ $p = 0.000$
Employee's communication	$F(6, 113) = 3.45$ $p = 0.004$	$F(5, 114) = 3.40$ $p = 0.007$	$F(6, 113) = 2.75$ $p = 0.016$
Service	$F(6, 113) = 8.20$ $p = 0.000$	$F(5, 114) = 4.38$ $p = 0.001$	$F(6, 113) = 6.98$ $p = 0.000$
Price suitability with provided quality	$F(6, 113) = 2.90$ $p = 0.012$	$F(5, 114) = 3.74$ $p = 0.004$	$F(6, 113) = 2.43$ $p = 0.030$
Product service and price satisfaction	$F(6, 113) = 9.82$ $p = 0.000$	$F(5, 114) = 10.49$ $p = 0.000$	$F(6, 113) = 3.37$ $p = 0.004$
Physical Environment Satisfaction	$F(6, 113) = 5.60$ $p = 0.000$	$F(5, 114) = 5.32$ $p = 0.000$	$F(6, 113) = 10.51$ $p = 0.000$

ANOVA was also used to determine whether the colour properties such as colour brightness, colour purity, and colour reflection influence the evaluation of the restaurants' physical environment. Table 4 displays the ANOVA results, except for the indicator table covers, almost all indicators showed significant differences at the  $p < 0.05$  level. As a result, this finding suggests that the environmental colours of quick-casual restaurants are significant in evaluating the physical environment of restaurants.



## 6 DISCUSSION and CONCLUSION

Several factors influence personal perception in interior environments. According to the literature, age, gender and education can all influence how interior design elements are perceived. Therefore, designers strive to use positive design elements that promote virtue, pleasure and personal significance. Numerous themes and design concepts can be used in a restaurant, ranging from classical to contemporary designs. Each design concept provides users with a different mental and mood state, which influences the dining experience. This study's literature review includes studies that demonstrate the psychological effects of interior design elements on the user's experience. Several results have been conducted to investigate the relationship between restaurant design elements such as finishing, furnishing and layout, and various factors influencing user satisfaction in the food and beverage industry. Senduk et al. (2016) conducted a study with 100 participants in a single restaurant to investigate the relationship between ambience and service quality concerning user satisfaction. Three main variables were considered: ambience, service quality, and user satisfaction, with three sub-indicators for ambience: cleanliness, concept, and interior design. In that regard, no additional details or indicators were considered. Service quality was measured using three sub-indicators: on-time delivery, employee service, and facilities, while user satisfaction was measured using three sub-indicators: price, product quality and place cosiness. The study's findings indicate that both ambience and service quality has an impact on user satisfaction (Senduk et al., 2016).

**Table 4.** One-Way ANOVA results based on colour brightness, colour purity, and colour reflection descriptions in terms of the evaluation of the restaurant's physical environment

Physical environment factor	Colour brightness	Colour purity	Colour reflection
Aesthetics of the facility	$F(6, 113) = 9.54$ $p = 0.000$	$F(5, 114) = 9.16$ $p = 0.000$	$F(6, 113) = 2.73$ $p = 0.016$
Furniture cleanness	$F(6, 113) = 4.36$ $p = 0.001$	$F(5, 114) = 4.47$ $p = 0.001$	$F(6, 113) = 3.97$ $p = 0.001$
Colour attractiveness	$F(6, 113) = 3.69$ $p = 0.002$	$F(5, 114) = 4.16$ $p = 0.002$	$F(6, 113) = 7.22$ $p = 0.000$
Colour suitability for restaurant theme	$F(6, 113) = 3.99$ $p = 0.001$	$F(5, 114) = 4.43$ $p = 0.001$	$F(6, 113) = 4.31$ $p = 0.001$
Furniture quality	$F(6, 113) = 5.16$ $p = 0.000$	$F(5, 114) = 3.58$ $p = 0.005$	$F(6, 113) = 4.88$ $p = 0.000$
Painting and picture	$F(6, 113) = 4.92$ $p = 0.000$	$F(5, 114) = 6.34$ $p = 0.000$	$F(6, 113) = 6.02$ $p = 0.000$
Wall decorations attractiveness	$F(6, 113) = 5.36$ $p = 0.000$	$F(5, 114) = 3.52$ $p = 0.005$	$F(6, 113) = 4.59$ $p = 0.000$
Restaurant layout	$F(6, 113) = 3.32$ $p = 0.005$	$F(5, 114) = 9.29$ $p = 0.000$	$F(6, 113) = 6.10$ $p = 0.000$
Space spaciousness	$F(6, 113) = 7.37$ $p = 0.000$	$F(5, 114) = 3.48$ $p = 0.006$	$F(6, 113) = 7.57$ $p = 0.000$
Privacy level	$F(6, 113) = 2.42$ $p = 0.031$	$F(5, 114) = 2.81$ $p = 0.020$	$F(6, 113) = 3.76$ $p = 0.002$
Size and shape of layout	$F(6, 113) = 6.02$ $p = 0.000$	$F(5, 114) = 16.24$ $p = 0.000$	$F(6, 113) = 8.51$ $p = 0.000$
Comfortable movement around the restaurant	$F(6, 113) = 4.37$ $p = 0.001$	$F(5, 114) = 5.62$ $p = 0.000$	$F(6, 113) = 5.59$ $p = 0.000$



Ambience	$F(6, 113) = 5.25$ $p = 0.000$	$F(5, 114) = 11.06$ $p = 0.000$	$F(6, 113) = 3.87$ $p = 0.000$
Temperature comfort	$F(6, 113) = 3.98$ $p = 0.001$	$F(5, 114) = 6.75$ $p = 0.000$	$F(6, 113) = 4.73$ $p = 0.000$
Pleasant scent	$F(6, 113) = 5.04$ $p = 0.000$	$F(5, 114) = 3.82$ $p = 0.003$	$F(6, 113) = 3.05$ $p = 0.008$
Background music	$F(6, 113) = 3.92$ $p = 0.001$	$F(5, 114) = 5.41$ $p = 0.000$	$F(6, 113) = 4.68$ $p = 0.000$
Noise level	$F(6, 113) = 3.78$ $p = 0.002$	$F(5, 114) = 3.72$ $p = 0.004$	$F(6, 113) = 2.30$ $p = 0.039$
Table arrangement	$F(6, 113) = 7.52$ $p = 0.000$	$F(5, 114) = 4.62$ $p = 0.001$	$F(6, 113) = 8.16$ $p = 0.000$
Lighting	$F(6, 113) = 5.89$ $p = 0.000$	$F(5, 114) = 4.04$ $p = 0.002$	$F(6, 113) = 10.22$ $p = 0.000$

Furthermore, Pecotic et al. (2014) conducted a study in several restaurants involving 106 participants to investigate the difference in the impact of the interior design of restaurants on user satisfaction between city residents and tourists. The study used 18 interior design indicators for restaurants, including size, colour, layout, furniture, lighting, artwork, wall design, music, communication, and tableware. The study's findings indicate that participants preferred medium-sized restaurants and medium spacing between tables. No specific colour is found to be preferred in any restaurant; however, participants suggested that a combination of colours is preferred over a single colour. Furniture comfort is reported to be the most crucial interior design element, followed by music and tableware condition (Pecotic et al., 2014).

Omar et al. (2015) conducted a study to investigate the relationship of four restaurant interiors with user satisfaction: spatial layout, interior design, colour, and music. A total of 411 respondents participated in the study via questionnaire. The questionnaire gathered demographic information and restaurant usage by asking respondents how frequently they visited restaurants per month. The second part of the questionnaire focused on evaluating the four main elements of the research. The highest correlation is found between colour and user satisfaction; there were also positive correlations between user satisfaction and spatial layout, interior design and music. (Omar et al., 2015). Moreover, many studies have identified four main factors that influence user satisfaction in restaurants: product quality, service quality, physical environment, and price. Product quality includes food taste and presentation, whereas perceived price measures how users evaluate the value for money provided by the restaurant. The physical environment is also assessed using a variety of indicators depending on the depth of the investigation into a particular indicator (Ryu & Han, 2010; Butt & Murtaza, 2011). According to a correlational study of the four different elements of restaurant user satisfaction, the physical design of the interior restaurant environment has a medium correlation with service quality, product quality, and user satisfaction. A hundred respondents took part in the study, including indicators for various elements (Sabir et al., 2014). Different interior design elements have also been shown in studies to be the most influential on user satisfaction in restaurants.

A study discovered that the most influential elements on user satisfaction are colour, layout, furniture design and furniture comfort (Almohaimmeed, 2017). Another study found that colour attractiveness is the most influential factor; however, other factors include painting and pictures, scent, table settings and lighting (Tüzünkan & Albayrak, 2016). Tüzünkan and Albayrak (2016) found several elements that influence satisfaction with the physical environment. Tüzünkan and Albayrak (2016) examined their data for variations based on demographics and frequency of restaurant usage. The study's findings



indicate significant differences in aesthetic, service staff appearance, and ambience indicators based on dining.

Moreover, significant differences in service staff layout and appearance are discovered based on education level, while significant differences in lighting are found based on age categories. A study found that the interior colour of the physical environment influences the appetite level. Colours ranging from red to yellow represent the highest level of appetite, while colours such as yellow-green, green, and purple represent the lowest level of appetite (Bhatia, 2003). Tantanatewin and Inkarojrit (2018) discovered that the interior colour of a restaurant influences the user's decision to enter or not enter the restaurant.

This study's findings corroborate several findings from the literature. O'Connor (2015) discussed the general effect of colour on user behaviour and cognition. As a result of testing the various colour aspects that are closely related to lighting in this study, this relationship has been proven once again, as stated by Manav (2013). The social and emotional behaviour of restaurant users has been found to differ based on the interior design elements of the space, which is consistent with the findings of Wardono et al. (2012). In addition, the current study establishes a link between user satisfaction and physical environment design, where Pecotic et al. (2014) and Omar et al. (2015) discovered similar results in their studies.

The statistical analysis of the results reveals that gender had no influence on user satisfaction, even though some physical environment indicators showed significant differences between males and females. Moreover, significant differences were found to be influenced by the participants' age; however, no influence was found by level of education or frequency of restaurant usage on user satisfaction or physical environment evaluation. Nonetheless, differences in colour properties such as brightness, purity, and reflection, resulted in significant differences in how participants indicated their user satisfaction and evaluated the physical environment. The significance of this study stems from the relationships that have been established between the demographic data of the participants, as well as the colour evaluation, and the levels of user satisfaction in restaurant contexts. Furthermore, this study separated user satisfaction elements from physical environment satisfaction to demonstrate that interior design elements play a significant role in user satisfaction in the interior environment and restaurants. Further studies can be conducted with a similar methodology in other retail contexts, such as malls and shops. Furthermore, restaurants lighting design needed to be evaluated to compare with user evaluations to establish new relationships.

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