The current issue and full text archive of this journal is available on Emerald Insight at:

https://www.emerald.com/insight/0959-0552.htm

The effects of indoor plants on customers’ shopping decisions in a restaurant environment

Effects of indoor plants

Kemal Yildirim

Department of Woodworking Industrial Engineering, Gazi University, Ankara, Turkey

Nazlı Nazende Yildirim Kaya

Department of Interior Architecture and Environmental Design, Atilim University, Ankara, Turkey, and

Ferdi Olmus

Department of Woodworking Industrial Engineering, Gazi University, Ankara, Turkey

Received 12 February 2020

Revised 25 February 2020

28 February 2020

13 June 2020

14 June 2020

18 June 2020

Accepted 28 June 2020

Abstract

Purpose – The purpose of this paper is to focus on the effects of indoor plants on customers’ shopping decisions in the restaurant environment.

Design/methodology/approach – The assumption of the research is that there is a relationship between restaurants where indoor plants are used and the customers’ shopping decisions (restaurant entry and purchase). A hypothetical study was performed to test this assumption that was based on the digital images of two different restaurants (restaurant with and restaurant without indoor plants) modelled in a virtual environment. The Likert scale questionnaire used in this study was completed by 335 participants.

Findings – Results indicated that restaurants designed with indoor plants had a more positive effect on the shopping decisions of participants than restaurants designed without indoor plants. The statistically significant results between evaluations of customers and their demographic backgrounds were determined. The male participants with a 26–35 age range showed more positive opinions about the plant designed restaurants than female participants with a 36–55 age range. Also, higher education graduate participants showed more positive opinions about the plant designed restaurant than secondary education graduate participants.

Originality/value – This paper reveals a significant relationship between restaurant design and shopping decisions. Results of the study suggest that retailers and designers may be able to make easily stores more appealing for customers by designing them with indoor plants.

Keywords Restaurant, Interior design, Indoor plants, Customer, Shopping decisions Paper type Research paper

1. Introduction

Today’s living conditions have distanced people from nature and imprisoned them inside buildings. Consequently, people spend most of their time in artificial environments away from green plants. However, in many studies ([Yildirim, 2013](#page6); [Sezen et al., 2017](#page6); [Rogers, 2019](#page6)), it was stated that continuous interaction with green plants for humans as a part of nature has positive effects.

In many scientific studies about living in healthier environments, it was observed that besides the positive effects on human psychology of the use of plants indoors, plants could be



The restaurant space used in this research was designed and visualized by M. Serhat Sezgin on behalf of Zebrano Furniture. We would like to thank Zebrano Furniture and M. Serhat Sezgin for their support. The authors would like to thank Ellen Andrea Yazar for her careful proofreading of the English text and the participants who contributed to the research questionnaire.

International Journal of Retail &



Distribution Management

© Emerald Publishing Limited

0959-0552

DOI [10.1108/IJRDM-02-2020-0053](https://doi.org/10.1108/IJRDM-02-2020-0053)

|  |  |  |
| --- | --- | --- |
| IJRDM | used to clean the polluted air from harmful pollutants emitted to the environment by harmful | |
|  | gas emissions ([Yildirim, 2013](#page6), [2018](#page6); [Smith et al., 2017](#page6)). The findings of [Smith et al. (2017)](#page6) | |
|  | demonstrate the potential of indoor plants to reduce carbon emissions of the [as] built | |
|  | environment through elimination or reduction of energy use and capital-intensive | |
|  | humidification air-conditioning systems. | |
|  | Research in the field of environmental psychology showed that using green plants in | |
|  | spaces with different functions, such as hospitals, office environments, roadside views, school | |
|  | settings, home environments and laboratory settings reduced stress and distraction and | |
|  | increased productivity and positivity ([Yildirim, 2018](#page6); [Li and Sullivan, 2016](#page6)). [Smith et al. (2017)](#page6) | |
|  | also identified a positive impact of plants on work environment aesthetics in an office in the | |
|  | same building with plants compared with a control office without plants. Moreover, [Genjo](#page6) | |
|  | [et al. (2019)](#page6) examined the green mental healthcare effect of plants on office workers. This | |
|  | study stated that plants have a mental recovery effect on the visual and subjective fatigue | |
|  | symptoms of office workers, such as drowsiness, dullness, and inability to concentrate. [Sezen](#page6) | |
|  | [et al. (2017)](#page6) pointed out that 72% of the participants affirmed that indoor plant use was | |
|  | necessary and that the green colour tone of plants refreshed the mind. Also, it was suggested | |
|  | that leaf, flower, fruit colours and plants with or without flowers have significant effects on | |
|  | the individual and the interior and plants gave dynamism to the interior, eliminated the | |
|  | monotony, provided a balance of colour and texture and changed the interior atmosphere. | |
|  | There were few studies in the literature about the effects of interior plant use on consumers’ | |
|  | purchasing decisions. [Yildirim’s (2018)](#page6) study on the effects of living walls designed in retail | |
|  | stores on users was asserted to be one of the most effective ways of affecting the consumer’s | |
|  | purchasing decisions in commercial places, while at the same time, it prevented air pollution | |
|  | and provided sound insulation. [Tifferet and Vilnai-Yavetz (2017)](#page6) examined the effects of store | |
|  | environmental factors on customer perception, emotions and shopping behaviours, | |
|  | suggesting that green plants used in retail stores increased consumers’ perceived service | |
|  | quality, pleasure, and reduced consumers’ arousal. Whereas [Ayalp et al. (2017)](#page6) stated that the | |
|  | physical environmental factors of cafe-restaurants have an impact on customers’ purchasing | |
|  | decisions. In the study by [Çagatay](#page6) | [et al. (2017)](#page6) they suggested that the use of proper and |
|  | suitable interior environmental factors could have positive effects on the quality of space, | |

users’ perceptual performance, spatial orientation, duration of stay and users’ wayfinding performance.

The studies discussed above have shown that green plants are used for different purposes, such as increasing indoor air quality, user efficiency and positivity, mental healing effects, reducing stress and distraction, and as an aesthetic interior design element in various places. However, there are few studies about using green plants in retail environments. Also, a study about the effects of the use of green plants on consumers’ purchasing decisions in a restaurant environment have not been encountered in the literature. Thus, it is thought that the study will fill this gap in the literature.

This research specifically aims to focus on the effects of indoor plants on customers’ shopping decisions due to the evaluation of different customer segments in a restaurant environment. Consequently, the purpose of the study is to enhance the design characteristics of the physical environmental factors of a restaurant environment to increase the customers’ satisfaction during shopping activity. The results of this research contribute to retailers, marketers, and designers in reconsidering the quality of restaurant environments.

2. Theoretical development and research hypotheses

The literature studies showed that indoor plants could have an impact on shopping decisions depending on the perceptual performance of customers ([Yildirim, 2018](#page6); [Tifferet and Vilnai-Yavetz, 2017](#page6); [Sezen et al., 2017](#page6)). [Jensen and van der Voordt (2020)](#page6) have recently reported that

the potential influence of living plants remained subject to many studies. Of these, in the study by [Apaolaza et al. (2020)](#page6), it was reported that indoor plants as ambient elements in restaurants can improve satisfaction and loyalty by enhancing the dimensions of aesthetics and escapism of the service experience, as well as the perception of service quality. However, a comparative study was not found in the literature that examined the effects of interiors designed with/without plants on shopping decisions of different customer segments. It would be useful to investigate the effects of plant use on customers in a cafe-restaurant environment.

The aim of interior design with plants is that spaces are functional and aesthetic for people, livable for plants, that is created with plants as architectural design elements and by using the various plant features. Designers may have different concerns, such as aesthetics, function, etc. when deciding on using green in interior spaces. The literature showed that green interior landscaping, vertical gardens, and green wall designs in retail stores could have positive effects on users’ shopping decisions ([Yildirim, 2018](#page6)). [Rosenbaum et al. (2016)](#page6) also stated that the use of green elements in a shopping centre, like natural settings, has many positive effects on shoppers, such as perceiving restorative qualities of the place and displaying positive behaviours. The results showed that using indoor plants in shopping centres positively affected the customers’ shopping decisions. Similarly, [Rosenbaum et al.](#page6) [(2018)](#page6) reported that a significant part of the retail design concept has a restorative and a transformative effect on customer behaviour at lifestyle centres, such as manicured gardens, plants, fountains and walkways typified by trendy retail dining. [Rosenbaum et al. (2019)](#page6) have recently assessed the effects on consumers of natural elements in retail settings or biophilic store design, as measured by electroencephalography (EEG). The study indicated that consumers prefer greenery in the retail settings and that they also spend time in these green areas that have positive effects, such as stress-reducing or restorative, health benefits. Another study indicated that a natural environment in a shopping mall creates a cognitive image of a mall that directly reinforces affective response and behavioural intention on a customer’s mind. In fact, this cognitive image of a mall generates a series of positive moods, which ultimately influences customer behaviour ([Orteg](#page6)on[-Cortazar and Royo-Vela, 2019](#page6)). In another research by [Orteg](#page6)on[-Cortazar and Royo-Vela (2017)](#page6), it was stated that arrangement of eco-natural environments in commercial establishments provides for an increase in the number of visits and purchases. The main hypothesis ([H1](#page6)) of the study is given below:

H1. The physical environmental factors of restaurants where indoor plants are used or not used have a significant effect on participants’ shopping decisions.

The literature study clearly showed that physical environmental factors (design and ambient elements) of a retail store positively affected the functional and perceptual evaluation of employees/customers ([Seo, 2013](#page6); [Yildirim et al., 2014](#page6), [2015](#page6); [Ayalp et al., 2016](#page6)).

Few studies have been conducted in retail stores on the differences between perceptual evaluations of customers by gender, age and educational level ([Yildirim et al., 2014](#page6), [2015](#page6); [Ayalp et al., 2016](#page6)). In these studies, the effect of indoor plants used in a restaurant environment as a design element on perceptual evaluations of the customers was not measured. It would be useful to know whether indoor plants differed among the perceptual evaluations of different customer segments, and if so, whether these differences were statistically significant. The second part of this study will investigate the effects of physical environmental factors of restaurants with or without indoor plants on the perceptions of customers according to gender, age, and educational level.

The comprehensive studies by [Yildirim et al. (2015)](#page6) and [Ayalp et al. (2016)](#page6), focused deeply on the relations between environmental factors of store and customer behaviour and insisted that further studies should consider the problem from the perspective of gender differences, which are mainly related to social and biological factors ([Yildirim et al., 2015](#page6); [Ayalp et al.,](#page6) [2016](#page6)). The concept of gender-role differences is a major factor in the development of

Effects of indoor plants

|  |  |
| --- | --- |
| IJRDM | behavioural differences. Male–female differences in aptitude and personality traits often |
|  | reflect traditional gender roles in society ([Yildirim et al., 2014](#page6), [2015](#page6); [Ayalp et al., 2016](#page6)). Studies |
|  | by [Yildirim et al. (2014)](#page6) found that female’s satisfaction judgements were largely influenced |
|  | by their initial negative emotions, whereas male’s satisfaction judgements depended on their |
|  | first positive emotions. The findings demonstrated that females blame a company more |
|  | frequently for a product harm crisis since they feel more personally vulnerable in a similar |
|  | crisis. Another study indicated that females’ expectations were high in services, such as |
|  | physical facilities and product presentation; personnel and store image in retail stores |
|  | ([Erasmus and Grabowski, 2013](#page6)). A similar study on store atmosphere showed that female |
|  | consumers were paying 32% more when a product was offered in a hedonic atmosphere |
|  | ([Borges et al., 2013](#page6)). Another study indicated that for the emotional reaction to hedonic |
|  | shopping due to gender difference, that positive emotions increased hedonic shopping levels |
|  | for males and negative emotions reduced hedonic shopping levels for females ([Herter et al.,](#page6) |
|  | [2014](#page6)). As [Yildirim et al. (2015)](#page6) and [Ayalp et al. (2016)](#page6) suggested for further studies in |
|  | shopping decisions, males and females think and behave differently based on the distinct |
|  | roles they play in society. The second hypothesis of the research is given below: |
|  | H2. Male participants have a more positive approach to shopping decisions in |
|  | restaurants than female participants. |
|  | Age has rarely been treated as an independent variable in perceptual evaluations of |
|  | restaurant environmental factors. Several of these studies focused on psychological aging. |
|  | [Yildirim et al. (2015)](#page6) and [Ayalp et al. (2016)](#page6) assessed the effects of age on perception of store |
|  | environments. These studies that examined the impact of age on final consumer evaluations |
|  | of store environmental factors have revealed that a shopper’s age significantly affected his or |
|  | her perception of store physical environment. Recent studies have suggested that younger |
|  | and older customers think and behave differently based on the alternative roles they play at |
|  | different life stages. The third hypothesis of the research is given below: |
|  | H3. Participants 26–35 years of age have a more positive approach to shopping decisions |
|  | in restaurants than participants 36–55 years of age. |
|  | The differences among customers’ educational levels have an important role in their |
|  | evaluations of the physical environmental factors of restaurants. Education was not |
|  | sufficiently used as an independent variable in evaluations of restaurants’ environmental |
|  | factors, because it is a difficult variable to define. [Yildirim et al. (2015)](#page6) found that significant |
|  | numbers of participants would either shorten the duration of their visit or immediately leave a |
|  | furniture store upon finding poor lighting, poor climatic conditions, bad ambient scent, or a |
|  | dirty environment. Those with a secondary education tended to report that such circumstances |
|  | would cause them to leave immediately, while higher educational group reported that such |
|  | environments would cause them to shorten the duration of their visit. This situation can be |
|  | explained via the differences in customers’ knowledge, experience, status-related lifestyle and |
|  | expectations. The level of experience and knowledge of customers may lead them to act in a |
|  | more critical manner. The fourth hypothesis of the research is given below: |
|  | H4. Secondary education participants have a more positive approach to shopping |
|  | decisions in restaurants than higher education participants. |
|  | The following methods were applied in this research to test these hypotheses. |
|  | 3. Methods |
|  | In this study, it was aimed to determine the effects of indoor plant use in restaurants on the |
|  | customers’ entry into the restaurant and on food and beverage purchasing decisions. The |

study was carried out by using consumers of a large shopping mall and by asking them to answer the questions as if they were in the restaurants of a large shopping mall. The characteristics of the research participants, questionnaire design and procedure and statistical evaluation of the research environment are discussed below.

3.1 Participants

The participants were randomly selected among consumers who prefer shopping in one of the large shopping malls in Ankara, Turkey. The detailed digital pictures of the restaurants with and without indoor plants were shown to participants on a white A4 size paper. At the beginning of the study, participants were given brief information about the survey and were then asked to answer the questionnaire by looking at the detailed digital pictures. The data were obtained in face-to-face meetings with an interviewer over a period of four weeks in 2018. The research was conducted at different times of the day and during the weekdays. It took the respondents approximately 15 minutes to complete each of the questionnaires. A total of 335 people participated in the study, 12 of them were excluded from the assessment because the questionnaire was filled incompletely and incorrectly. Of the 323 participants, 48.3% were female, 51.7% were male, 50.9% were 26–35 years old, 49.1% were 36–55 years old and 22.6% of them were secondary education graduates.

3.2 Questionnaire design and procedure

Based on the research hypotheses, the effects of the environmental factors of the restaurants where indoor plants are used on the participants’ shopping decisions (restaurant entry and purchase) will be determined. These were measured via a questionnaire based on scales that have been validated and found to be reliable in previous research ([Yildirim et al., 2014](#page6), [2015](#page6); [Ayalp et al., 2016](#page6)). The dependent variables related to the shopping decisions displayed in [Table 1](#page6) were measured using a seven-point Likert-type scale, ranging from 1 5 strongly agree to 7 5 strongly disagree. The questionnaire form used consisted of two parts: the first part asked for general information, such as age, gender, and education of the participants. The

Effects of indoor plants

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent |  |  | Items | Scale |
| variables | Scale items | | reliability | reliability |
|  |  |  |  |  |
| Restaurant | E1 | I can go in because I’m impressed by the restaurant’s | 0.91 | 0.93 0.95 |
| entry |  | environmental factors |  |  |
|  | E2 | The restaurant’s environmental factors are very | 0.91 |  |
|  |  | inviting for entry |  |  |
|  | E3 | The restaurant’s environmental factors are very | 0.91 |  |
|  |  | attractive for entry |  |  |
|  | E4 | I can always come because I’m impressed by the | 0.92 |  |
|  |  | restaurant’s environmental factors |  |  |
| Purchase | P1 | The restaurant’s environmental factors play an | 0.88 | 0.90 |
|  |  | important role in my decision to purchase |  |  |
|  | P2 | The restaurant’s environmental factors are the | 0.88 |  |
|  |  | starting point of my decision to purchase |  |  |
|  | P3 | The restaurant’s environmental factors are effective in | 0.87 |  |
|  |  | my decision to purchase |  |  |
|  | P4 | The restaurant’s environmental factors make it easier | 0.88 |  |
|  |  | for me to make faster buying decisions |  |  |
|  | P5 | The restaurant’s environmental factors are reassuring | 0.88 |  |
|  |  | on my decision to buy |  |  |

Note(s): Item reliability and scale reliability were provided for each dependent variable

Table 1.

Reliability test results

of the dependent

variables

|  |  |
| --- | --- |
| IJRDM | second part consisted of the measures of participants’ shopping decisions about the |
|  | perceptual evaluations of the virtual design restaurants. |
|  | In this study, the data related to the evaluation of the restaurants with and without indoor |
|  | plants were obtained from participants’ ratings of digital pictures of two hypothetical |
|  | restaurants ([Plate 1](#page6)). Research into spatial cognition has benefited from the introduction of |
|  | virtual reality (VR) technology. However, it is important to assess similarities and differences |
|  | between knowledge obtained in real life and that obtained in virtual environments (VEs) (i.e. |
|  | to verify that the best transfer of knowledge from the VE to the real situation is obtained). |
|  | Transfer studies make a distinction between transfer of skill (from one sensory modality to |
|  | another) and transfer of spatial knowledge (knowledge conservation from learning to test |
|  | situation). Several studies have demonstrated an effective transfer of skill and/or spatial |
|  | knowledge from virtual to real environments (REs) (virtual/real transfer), indicating that |
|  | spatial knowledge acquired in VEs is quite like that acquired in REs ([Wallet et al., 2013](#page6)). Some |
|  | authorities have explicitly deemed the addition of digital pictures a key step toward enhanced |
|  | visualization of information ([Yildirim et al., 2014](#page6) and [2019](#page6)). [Yildirim et al. (2019)](#page6) have |
|  | emphasized that using virtual spaces yields accurate results and can be achieved much less |
|  | expensively than creating RE scenarios. |
|  | 3.3 Research environment |
|  | Digital photographs of the Casablanca Restaurant, which was designed and applied by |
|  | Zebrano Furniture Company, were used as the experimental space. The walls and columns of |
|  | this restaurant are covered with light brown and cream-colored stone. The restaurant has a |
|  | suspended ceiling by using wicker rope. The floor is covered with herringbone wooden |
|  | walnut parquet. |
|  | Winder and climber plants are used on a wireframe divider wall, various plants in wooden |
|  | pots and winder and climber plants on wicker ropes. Some of the seats used in the restaurant |
|  | and coffee tables, tables and chairs are made of wooden material and their surfaces are |



Plate 1.

Digital pictures of restaurants studied

Restaurant with indoor plants Restaurant without indoor plants

covered with clear walnut coloured varnish. Brown leather is used on some of the seats and oil green leather is used on some of the seats and quilted upholstery. The auxiliary elements (accessories, etc.) used in the space were selected according to the interior characteristics ([Plate 1](#page6)).

3.4 Statistical analysis

It was necessary to summarize and present the data obtained from the questionnaires for understanding and comparing them with other results. The evaluations of the physical environmental factors of the restaurants by participants were accepted as “dependent variables” ([Tables 1–4](#page6)), whereas, the use of indoor plants at the restaurants on participants’ gender, age and educational level were accepted as “independent variables.” After conducting reliability tests of the data obtained with the Cronbach’s alpha method ([Table 1](#page6)), the categorical means and standard deviations were determined. Afterwards, to examine the effect of differences in the use of indoor plants, gender, age and educational level variables on the perceptual evaluations of the physical environmental factors of the restaurants, the appropriate techniques of the One-Way Analysis of Variance (ANOVA) were used. Data were given in graphs to compare the significant means of the variance in the analysis.

4. Results

In this study, it was aimed to enable customers to evaluate physical environmental factors of restaurants in a positive way and to collect the necessary data to improve the environmental comfort conditions with plants used in restaurants (plant and algae wall panels, potted plants, etc.). As a research environment, digital pictures of two restaurants, which were designed with or without plants and that have the same design characteristics except plants, were used and the results obtained have been given systematically below:

As shown in [Table 1](#page6), reliability of the data obtained was tested with Cronbach’s alpha for determining the effects of indoor plants used in restaurants on participants’ shopping decisions (restaurant entry and purchase). The reliability coefficient of the four dependent variables used to measure participants’ decisions to enter the restaurant was found to be 0.93, the five dependent variables used to measure purchasing decisions were determined to be

Effects of indoor plants

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Restaurants | |  |  |  |  |
|  |  |  |  | Restaurants | |  |  |  |
|  |  | Restaurants with | | without indoor | |  |  |  |
|  |  | indoor plants | |  | plants | ANOVA results | |  |
| Dependent variables |  | M | SD | M | SD | F | df | Sig |
|  |  |  |  |  |  |  |  |  |
| Restaurant entry | E1 | 2.137a | 1.601 | 4.096 | 1.824 | 210.521 | 1 | 0.000\* |
|  | E2 | 2.217 | 1.564 | 4.046 | 1.682 | 204.748 | 1 | 0.000\* |
|  | E3 | 2.233 | 1.512 | 4.028 | 1.694 | 201.806 | 1 | 0.000\* |
|  | E4 | 2.422 | 1.589 | 4.259 | 1.592 | 215.458 | 1 | 0.000\* |
| Purchase | P1 | 2.450 | 1.565 | 4.167 | 1.549 | 196.313 | 1 | 0.000\* |
|  | P2 | 2.752 | 1.629 | 4.272 | 1.528 | 149.612 | 1 | 0.000\* |
|  | P3 | 2.590 | 1.438 | 4.290 | 1.615 | 199.517 | 1 | 0.000\* |
|  | P4 | 2.808 | 1.583 | 4.414 | 1.561 | 168.671 | 1 | 0.000\* |
|  | P5 | 2.544 | 1.459 | 4.176 | 1.594 | 184.177 | 1 | 0.000\* |

Note(s): \*p < 0.001 level is significant

M: Mean value, SD: Standard deviation, F: F value, df: Degree of freedom

1. Variable means ranked from 1 to 7, 1: Strongly agree, 7: Strongly disagree. Higher numbers were negative responses

Table 2.

ANOVA test results,

mean and standard

deviation of

restaurants with or

without indoor plants

IJRDM

Table 3.

Mean and standard deviation values and ANOVA results of participants’ evaluations according to gender

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Gender | |  |  |  |  |
|  |  | Female | |  | Male |  | ANOVA results | |
| Dependent variables |  | M | SD | M | SD | F | df | Sig |
|  |  |  |  |  |  |  |  |  |
| Restaurant entry | E1 | 3.240 | 1.994 | 3.006 | 1.953 | 2.277 | 1 | 0.132is |
|  | E2 | 3.212 | 1.891 | 3.063 | 1.837 | 1.027 | 1 | 0.311is |
|  | E3 | 3.231 | 1.835 | 3.042 | 1.840 | 1.704 | 1 | 0.192is |
|  | E4 | 3.458 | 1.873 | 3.237 | 1.796 | 2.360 | 1 | 0.125is |
| Purchase | P1 | 3.535 | 1.811 | 3.102 | 1.721 | 9.729 | 1 | 0.002\* |
|  | P2 | 3.583 | 1.784 | 3.449 | 1.72 | 0.947 | 1 | 0.331is |
|  | P3 | 3.535 | 1.758 | 3.356 | 1.739 | 1.691 | 1 | 0.194is |
|  | P4 | 3.638 | 1.795 | 3.590 | 1.737 | 0.119 | 1 | 0.730is |
|  | P5 | 3.429 | 1.770 | 3.299 | 1.696 | 0.910 | 1 | 0.341is |

Note(s): \*p < 0.05 level is significant. is: p < 0.05 is insignificant

M: Mean value, SD: Standard deviation, F: F value, df: Degree of freedom

1. Variable means ranked from 1 to 7, 1: Strongly agree, 7: Strongly disagree. Higher numbers were negative responses

Table 4.

Mean and standard deviation values and ANOVA results of participants’ evaluations according to age

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Age |  |  |  |  |
|  |  | 26–35 |  |  | 36–55 |  | ANOVA results | |
| Dependent variables |  | M | SD | M | SD | F | df | Sig |
|  |  |  |  |  |  |  |  |  |
| Restaurant entry | E1 | 2.964a | 1.882 | 3.281 | 2.058 | 4.186 | 1 | 0.041\* |
|  | E2 | 2.985 | 1.779 | 3.290 | 1.937 | 4.360 | 1 | 0.037\* |
|  | E3 | 3.006 | 1.757 | 3.265 | 1.914 | 3.212 | 1 | 0.074\*\* |
|  | E4 | 3.243 | 1.788 | 3.448 | 1.881 | 2.012 | 1 | 0.157is |
| Purchase | P1 | 3.198 | 1.758 | 3.429 | 1.791 | 2.747 | 1 | 0.098\*\* |
|  | P2 | 3.389 | 1.779 | 3.644 | 1.716 | 3.420 | 1 | 0.065\*\* |
|  | P3 | 3.353 | 1.712 | 3.536 | 1.785 | 1.783 | 1 | 0.182is |
|  | P4 | 3.550 | 1.742 | 3.678 | 1.787 | 0.851 | 1 | 0.357is |
|  | P5 | 3.182 | 1.681 | 3.549 | 1.767 | 7.299 | 1 | 0.007\* |

Note(s): \*p < 0.05 and \*\*p < 0.10 levels are significant. is: p < 0.05 is insignificant

M: Mean value, SD: Standard deviation, F: F value, df: Degree of freedom

1. Variable means ranked from 1 to 7, 1: Strongly agree, 7: Strongly disagree. Higher numbers were negative responses

0.90 and the reliability coefficient of the scale was 0.95. In some previous studies ([Panayides,](#page6) [2013](#page6)), it has been reported that alpha reliability coefficients for all elements were considered reliable when the coefficients exceeded 0.70. The Cronbach’s alpha coefficients obtained in this study are above this value. Accordingly, the data obtained were considered reliable.

In this section, the differences between the participants evaluating the restaurant’s environmental factors designed with or without plants were analysed by statistical methods. The categorical means, standard deviation values and ANOVA test results of the data obtained from the analyses have been given in [Table 2](#page6).

According to the values given in [Table 2](#page6), there were statistically significant differences between evaluations of the environmental factors of the restaurants with and without indoor plants on the participants’ shopping decisions. It was determined that the participants perceived more positively the restaurant’s physical environmental factors with indoor plants than without indoor plants. The ANOVA test was performed to determine whether there was a statistically significant difference between the participants’ evaluations at the level of p < 0.05. The differences between evaluations of the environmental factors regarding the

effects of indoor plants used in restaurants on shopping decisions of the participants were found to be statistically significant at the level of p < 0.001 for E1 (F 5 210.521; df 5 1; sig. 5 0.000), E2 (F 5 204.748; df 5 1; sig. 5 0.000), E3 (F 5 201.806; df 5 1; sig. 5 0.000), E4 (F 5 215.458; df 5 1; sig. 5 0.000), P1 (F 5 196.313; df 5 1; sig. 5 0.000), P2 (F 5 149.612; df 5 1; sig. 5 0.000), P3 (F 5 199.517; df 5 1; sig. 5 0.000), P4 (F 5 168.671; df 5 1; sig. 5 0.000) and P5 (F 5 184.177; df 5 1; sig. 5 0.000) dependent variables. The graphical expression of these results has been given in [Figure 1](#page6).

The effects of the restaurant with indoor plants on the participants’ shopping decisions (restaurant entry and purchase) have been shown in [Figure 1](#page6). It was observed that the restaurant without indoor plants had the highest values (negative value) for each of the dependent variables, while the restaurant with indoor plants had the lowest values (positive value). These results showed that the differences between restaurant with and without indoor plants have significant effects on the perceptual evaluations of the participants. It can be stated that conditions of the restaurant with indoor plants and restaurant without indoor plants have statistically significant effects on the participants’ perceptual evaluations of the physical environmental factors of the restaurant. This conclusion supported this study’s main hypothesis ([H1](#page6)). These results showed that restaurants using indoor plants are perceived and evaluated more positively than restaurants without indoor plants. These results support the results of previous studies by [Yildirim (2018)](#page6), [Ayalp et al. (2017)](#page6), [Yildirim](#page6) [(2013)](#page6), [Tifferet and Vilnai-Yavetz (2017)](#page6) and [Sezen et al. (2017)](#page6).

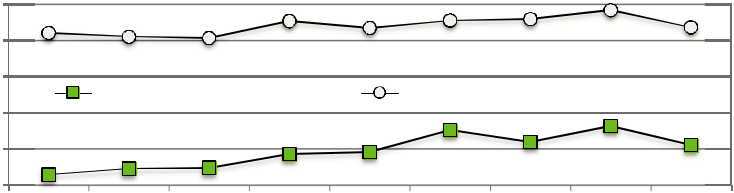
The differences between evaluations of the restaurant’s environmental factors according to participants’ gender (female and male) were determined. According to the analysis results, the mean and standard deviation values and ANOVA results of the dependent variables (items) used to evaluate the restaurant’s physical environmental factors have been given in [Table 3](#page6).

According to the results given in [Table 3](#page6), there were important differences between evaluations of the restaurant’s environmental factors for the effects of the participants’ gender (female and male) on shopping decisions. It was found that males perceive more positively the restaurant’s physical environmental factors than females. The ANOVA test was performed to determine whether there was a statistically significant difference between the participants’ evaluations according to gender at the level of p < 0.05. Although there may be differences between evaluations according to participants’ gender, no statistically significant difference was found at the level of p < 0.05 for all dependent variables except for P1 (F 5 9.729; df 5 1; sig. 5 0.002). The graphical expression of these results has been given in [Figure 2](#page6).

As observed in [Figure 2](#page6), males have the lowest values (positive value) for all dependent variables. However, no statistically significant difference was found between evaluations according to participants’ gender for the other dependent variables except for P1. This

Effects of indoor plants

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 4.5 |  |  |  |  |  |  |  |  |  |
| **Means** | 4 |  |  |  |  |  |  |  |  |  |
| 3.5 | **Restaurant with indoor plants** | | |  | **Restaurant without indoor plants** | | |  |  |
|  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
| **Scale** |  |  |  |  |  |  |  |  |  |
| 2.5 |  |  |  |  |  |  |  |  |  |
|  | 2 |  |  |  |  |  |  |  |  |  |
|  | E1 | E2 | E3 | E4 | P1 | P2 | P3 | P4 | P5 |  |



**Note(s)**: Means of the variables listed between 1-7 (large numbers are negative

Figure 1. Effect of restaurant with and without indoor plants on the dependent variables

responses)

|  |  |
| --- | --- |
| IJRDM | finding did not support the second hypothesis ([H2](#page6)). Females previously had a more negative |
|  | approach in the perceptual evaluations of restaurants than males. Similar studies by [Ayalp](#page6) |
|  | [et al. (2017)](#page6), [Yildirim et al. (2014](#page6), [2015)](#page6) and [Ayalp et al. (2016)](#page6) supported these results. |
|  | In another analysis, the differences between evaluations of the environmental factors of |
|  | the restaurants according to participants’ age (26–35 and 36–55) were determined. According |
|  | to the analysis results, the mean and standard deviation values and ANOVA results of the |
|  | dependent variables (items) used to evaluate the physical environmental factors of the |
|  | restaurants have been given in [Table 4](#page6). |
|  | According to the results given in [Table 4](#page6), there were important differences between |
|  | evaluations of the restaurant’s environmental factors for the effects of participants’ ages |
|  | (26–35 and 36–55) on shopping decisions. It was found that younger participants (26–35) |
|  | perceived the restaurant’s physical environmental factors more positively than middle- |
|  | aged participants (36–55). The ANOVA test was performed to determine whether there was |
|  | a statistically significant difference between the participants’ evaluations according to age |
|  | at the level of p < 0.05. Consequently, among the evaluations of the participants according |
|  | to their age levels, for E1 (F 5 4.186; df 5 1; sig. 5 0.041), E2 (F 5 4.360; df 5 1; sig. 5 0.037), |
|  | E3 (F 5 3.212; df 5 1; sig. 5 0.074) for P1 (F 5 2.747; df 5 1; sig. 5 0.098), P2 (F 5 3.420; |
|  | df 5 1; sig. 5 0.065) and P5 (F 5 7.299; df 5 1; sig. 5 0.007) dependent variables, |
|  | statistically significant differences were found at the levels of p < 0.05 and p < 0.10. These |
|  | results supported the third hypothesis of the study ([H3](#page6)). These results supported the results |
|  | obtained by [Yildirim et al. (2015)](#page6) and [Ayalp et al. (2016)](#page6). The graphical expression of these |
|  | results has been given in [Figure 3](#page6). |
|  | In another analysis, the differences between evaluations of the restaurant’s environmental |
|  | factors according to participants’ educational levels (secondary and higher) were determined. |
|  | According to the analysis results, the mean and standard deviation values and ANOVA |

Figure 2.

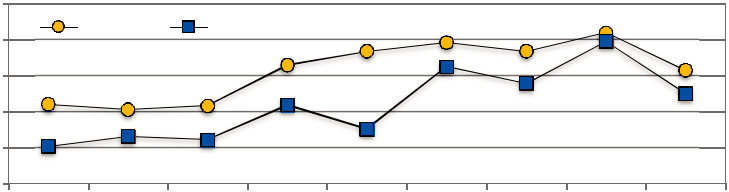
The effect of

participants’ gender on

dependent variables

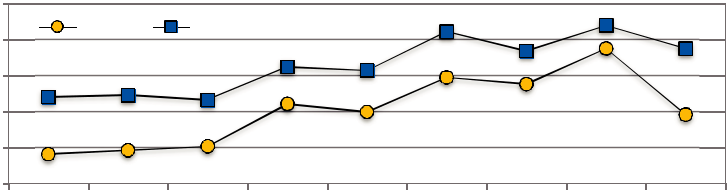
Figure 3. The effect of participants’ age on dependent variables

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 3.8 | **Female** | **Male** |  |  |  |  |  |  |  |
| **Means** | 3.6 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| 3.4 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **Scale** | 3.2 |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | 2.8 |  |  |  |  |  |  |  |  |  |
|  | E1 | E2 | E3 | E4 | P1 | P2 | P3 | P4 | P5 |  |



**Note(s)**: Means of the variables listed between 1-7 (large numbers are negativeresponses)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 3.8 | **26-35** | **36-55** |  |  |  |  |  |  |  |
| **Means** | 3.6 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| 3.4 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **Scale** | 3.2 |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | 2.8 |  |  |  |  |  |  |  |  |  |
|  | E1 | E2 | E3 | E4 | P1 | P2 | P3 | P4 | P5 |  |



**Note(s)**: Means of the variables listed between 1-7 (large numbers are negative

responses)

results of the dependent variables (items) used to evaluate the restaurant’s physical environmental factors have been given in [Table 5](#page6).

According to the results given in [Table 5](#page6), there were important differences between evaluations of the restaurant’s environmental factors for the effects of participants’ educational levels (secondary and higher) on shopping decisions. It was observed that those with secondary education perceived the restaurant’s physical environmental factors more positively than those with higher education. The ANOVA test was performed to determine whether there was a statistically significant difference between the participants’ evaluations according to education at the level of p < 0.05. As a result, among the evaluations of the participants according to their educational levels, for P1 (F 5 3.032; df 5 1; sig. 5 0.082) and P3 (F 5 4.344; df 5 1; sig. 5 0.038) dependent variables, statistically significant differences were found at the levels of p < 0.05 and p < 0.10. No statistically significant difference was found at the level of p < 0.05 for all other dependent variables. The graphical expression of these results has been given in [Figure 4](#page6).

As found in [Figure 4](#page6), secondary education participants received the lowest values (positive value) for all variables. However, no statistically significant difference was found between evaluations according to participants’ educational levels for the variables other than the P1 and P3 dependent variables. This finding partially supported the fourth hypothesis ([H4](#page6)). These results supported the results obtained by [Yildirim et al. (2015)](#page6) and [Ayalp et al. (2016)](#page6).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Education | |  |  |  |  |
|  |  | Secondary | | Higher | |  | ANOVA results | |
| Dependent variables |  | M | SD | M | SD | F | df | Sig |
|  |  |  |  |  |  |  |  |  |
| Restaurant entry | E1 | 2.917 | 2.042 | 3.180 | 1.952 | 1.491 | 1 | 0.223is |
|  | E2 | 3 | 2.018 | 3.215 | 1.841 | 1.095 | 1 | 0.296is |
|  | E3 | 3.018 | 1.905 | 3.223 | 1.819 | 1.040 | 1 | 0.308is |
|  | E4 | 3.174 | 1.870 | 3.450 | 1.826 | 1.907 | 1 | 0.168is |
| Purchase | P1 | 3.045 | 1.833 | 3.386 | 1.783 | 3.032 | 1 | 0.082\*\* |
|  | P2 | 3.349 | 1.781 | 3.576 | 1.705 | 1.475 | 1 | 0.225is |
|  | P3 | 3.110 | 1.745 | 3.496 | 1.687 | 4.344 | 1 | 0.038\* |
|  | P4 | 3.422 | 1.786 | 3.713 | 1.714 | 2.388 | 1 | 0.123is |
|  | P5 | 3.294 | 1.723 | 3.426 | 1.710 | 0.506 | 1 | 0.477is |

Note(s): \*p < 0.05 and \*\*p < 0.10 levels are significant. is: p < 0.05 is insignificant

M: Mean value, SD: Standard deviation, F: F value, df: Degree of freedom

1. Variable means ranked from 1 to 7, 1: Strongly agree, 7: Strongly disagree. Higher numbers were negative responses

Effects of indoor plants

Table 5.

Mean and standard

deviation values and

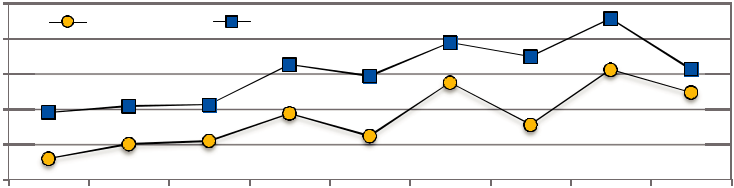
ANOVA results of

participants’

evaluations according

to educational levels

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 3.8 | **Secondary** |  | **Higher** |  |  |  |  |  |  |
|  | 3.6 |  |  |  |  |  |  |  |
| **Means** |  |  |  |  |  |  |  |  |  |
| 3.4 |  |  |  |  |  |  |  |  |  |
| 3.2 |  |  |  |  |  |  |  |  |  |
| **Scale** |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |
|  | 2.8 |  |  |  |  |  |  |  |  |  |
|  | E1 | E2 | E3 | E4 | P1 | P2 | P3 | P4 | P5 |  |



**Note(s)**: Means of the variables listed between 1-7 (large numbers are negative

Figure 4.

The effect of

participants’

educational levels on

dependent variables

responses)

|  |  |
| --- | --- |
| IJRDM | 5. Discussion |
|  | This study focused on determining the effects of plants used in restaurants on the shopping |
|  | decisions of participants. With the data obtained from this study; it is aimed to make cafes |
|  | and restaurants where plants are used in their design, to improve the comfort conditions, to |
|  | increase the satisfaction of the customers and for them to spend more time in the space. |
|  | It showed that the winder, climber, and potted plants in the researched restaurants have |
|  | important effects on the perceptual evaluations of participants. It was found that evaluations |
|  | of the restaurant’s physical environmental factors with plants and without plants were |
|  | statistically different for restaurant entry and purchase variables. It has been found that there |
|  | was a statistically significant difference (at the level of p < 0.001) between the restaurants |
|  | with and without plants for these dependent variables. This result shows that restaurants |
|  | with plants have more positive effects on the shopping decisions of participants compared to |
|  | restaurants without plants. The use of indoor plants in retail stores such as cafes-restaurants |
|  | can positively affect the shopping decisions of customers. |
|  | The other significant conclusion of this study was the difference in gender groups according |
|  | to evaluations of the restaurant’s physical environmental factors with or without indoor plants. |
|  | Females were more critical than males about the restaurant’s environmental factors. This |
|  | conclusion supports findings, which concluded that female’s satisfaction judgements were |
|  | largely influenced by their initial negative emotions, whereas, male’s satisfaction judgements |
|  | depended on their first positive emotions, suggesting a primacy effect for both genders. |
|  | [Yildirim et al. (2015)](#page6) found that females spent more time in stores than males ([Yildirim et al.,](#page6) |
|  | [2014](#page6), [2015](#page6); [Ayalp et al., 2016](#page6)). From this result, it can be inferred that females are more critical in |
|  | their shopping attitudes. |
|  | Another conclusion showed that there are significant differences between participants’ |
|  | evaluations in the 26–35 and 36–55 years of age range of the restaurant’s physical |
|  | environmental factors for restaurant entry and purchase variables. It was found that young |
|  | participants perceived the restaurant’s physical environmental factors more positively than |
|  | middle-aged participants. These conclusions support the results obtained by [Yildirim et al.](#page6) |
|  | [(2015)](#page6) and [Ayalp et al. (2016)](#page6). |
|  | The other conclusion showed that there were significant differences between evaluations |
|  | of secondary and higher education participants of the restaurant’s physical environmental |
|  | factors for restaurant entry and purchase variables. It was observed that participants with |
|  | secondary education perceived the restaurant’s physical environmental factors more |
|  | positively than those with higher education. These results supported those obtained by |
|  | [Yildirim et al. (2015)](#page6) and [Ayalp et al. (2016)](#page6). |
|  | 6. Managerial implications and future research |
|  | The results obtained in this research showed that the visually aimed winder/climber plants, |
|  | potted plants, shrubs, and bushes in the design of retail stores play an important role in the |
|  | formation of inviting, attractive and effective natural environments. Abundant ideas can be |
|  | given on the determination of whether people have an opinion about the symbolic meaning of |
|  | the space in which they are found, on measurement of the sensibility of meaningful identity of |
|  | the space, on determination of whether they derive pleasure from being in the space, on |
|  | comparison of the design and the expectations of customers and for emphasizing and |
|  | developing aspects of the spatial design. Making use of plants in restaurant designs would |
|  | positively influence the customers’ pleasure and quality of life. Business owners could obtain |
|  | “a strategical commercial advantage” by using indoor plants in the restaurant’s design for |
|  | forming positive first impressions about physical environmental conditions of different |
|  | customer sectors after entering the restaurant and for them to feel more at ease and |
|  | comfortable. |

The results of the research suggested that retailers and designers may be able to easily attract consumers’ perception by using indoor plants in cafes and restaurants. Future studies could examine the effects of indoor plants on customers’ shopping decisions in a real restaurant environment, as opposed to the digital platform of this study.

References

Apaolaza, V., Hartmann, P., Fernandez-Robin, C. and Yanez,~ D. (2020), “Natural plants in hospitality servicescapes: the role of perceived aesthetic value”, International Journal of Contemporary Hospitality Management, Vol. 32 No. 2, pp. 665-682, doi: [10.1108/IJCHM-03-2019-0240](https://doi.org/10.1108/IJCHM-03-2019-0240).

Ayalp, N., Yildirim, K., Bozdayi, M. and Cagatay, K. (2016), “Consumers’ evaluations of fitting rooms in retail clothing stores”, International Journal of Retail and Distribution Management, Vol. 44 No. 5, pp. 524-539.

Ayalp, N., Yildirim, K. and Çagatay, K. (2017), “Effect on users of the seating element types in cafes/ restaurants”, Gazi University Journal of Science, Vol. 30 No. 4, pp. 15-28.

Borges, A., Babin, B.J. and Spielmann, N. (2013), “Gender orientation and retail atmosphere: effects on value perception”, International Journal of Retail and Distribution Management, Vol. 41 No. 7, pp. 498-511.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Çagatay, | K., Hidayetoglu, M.L. and Yildirim, K. (2017), “Lise koridor duvarlarında kullanılan renklerin | | | | | |  |
| €ogrencilerin | | algısal degerlendirmeleri | | | uzerindeki€ | etkileri” (The effects on the perceptual |  |
| evaluations | | of students of | | the colours used on | | high school corridor walls)”, Hacettepe |  |
| € |  |  | Fakultesi€ | Dergisi (H. U. Journal of Education), Vol. 32 No. 2, pp. 466-479, (in | | |  |
| U niversitesi Egitim | | |  |

Turkish).

Erasmus, A.C. and Grabowski, A. (2013), “Female customers’ expectation of the service offering and their perception of the service quality in an emerging clothing market”, International Journal of Consumer Studies, Vol. 37 No. 1, pp. 2-12.

Genjo, K., Matsumoto, H., Ogata, N. and Nakano, T. (2019), “Feasibility study on mental health-care effects of plant installations in office spaces”, Japan Architectural Review, Vol. 2 No. 3,

1. 376-388, available at: <https://onlinelibrary.wiley.com/doi/epdf/10.1002/2475-8876.12098> (accessed 21 February 2020).

Herter, M.M., Santos, C.P. and Pinto, D.C. (2014), “‘Man, I shop like a woman!’ the effects of gender and emotions on consumer shopping behaviour outcomes”, International Journal of Retail and Distribution Management, Vol. 42 No. 9, pp. 780-804.

Jensen, P.A. and van der Voordt, T.J.M. (2020), “Healthy workplaces: what we know and what else we need to know”, Journal of Corporate Real Estate, Vol. 22 No. 2, pp. 95-112, doi: [10.1108/JCRE-11-2018-0045](https://doi.org/10.1108/JCRE-11-2018-0045).

Li, D. and Sullivan, W.C. (2016), “Impact of views to school landscapes on recovery from stress and mental fatigue”, Landscape and Urban Planning No. 148, pp. 149-158.

Ortegon-Cortazar, L. and Royo-Vela, M. (2017), “Attraction factors of shopping centers: effects of design and eco-natural environment on intention to visit”, European Journal of Management and Business Economics, Vol. 26 No. 2, pp. 199-219, doi: [10.1108/EJMBE-07-2017-012](https://doi.org/10.1108/EJMBE-07-2017-012).

Ortegon-Cortazar, L. and Royo-Vela, M. (2019), “Nature in malls: effects of a natural environment on the cognitive image, emotional response, and behaviors of visitors”, European Journal of Management and Business Economics, Vol. 21 No. 1, pp. 38-47, doi: [10.1016/j.iedeen.2018.08.001](https://doi.org/10.1016/j.iedeen.2018.08.001).

Panayides, P. (2013), “Coefficient alpha: interpret with caution”, Europe’s Journal of Psychology, Vol. 9 No. 4, pp. 687-696.

Rogers, K. (2019), “Added information on the health benefits of spending time in nature”, June 25, 2019, Biophilia hypothesis, available at: <https://www.britannica.com/science/biophilia-hypothesis>.

Rosenbaum, M.S., Otalora, M.L. and Ramırez, G.C. (2016), “The restorative potential of shopping malls”, Journal of Retailing and Consumer Services, Vol. 31, pp. 157-165.

Effects of indoor plants

IJRDM

Rosenbaum, M.S., Ramirez, G.C. and Camino, J.R. (2018), “A dose of nature and shopping: the restorative potential of biophilic lifestyle center designs”, Journal of Retailing and Consumer Services, Vol. 40, pp. 66-73, doi: [10.1016/j.jretconser.2017.08.018](https://doi.org/10.1016/j.jretconser.2017.08.018).

Rosenbaum, M.S., Ramirez, G.C. and Matos, M. (2019), “A neuroscientific perspective of consumer responses to retail greenery”, Service Industries Journal, Vol. 39 Nos 15-16, pp. 1034-1045, doi: [10.1080/02642069.2018.1487406](https://doi.org/10.1080/02642069.2018.1487406), Innovations to Advance Sustainability Behaviours.

Seo, K. (2013), “Analysis of fitting room environments: effects on older clothing shoppers’ shopping patronage intention”, PhD diss, Iowa State University, Ames, Iowa.

|  |  |  |  |
| --- | --- | --- | --- |
| Sezen, I., Aytatlı, B., Agr | | \_ |  |
| ılı, R.A. and Patan, E. (2017), “Iç mekan^ tasarımında bitki kullanımının birey |  |
| ve mek^an uzerine€ | etkileri” (Effects of plant use in indoor design on individual and place)”, ATA | |  |

Planlama ve Tasarım Dergisi, Vol. 1 No. 1, pp. 25-34, (in Turkish, abstract in English).

Smith, A.J., Fsadni, A. and Holt, G.D. (2017), “Indoor living plants’ effects on an office environment”, Facilities, Vol. 35 Nos 9/10, pp. 525-542.

Tifferet, S. and Vilnai-Yavetz, I. (2017), “Phytophilia and service atmospherics: the effect of indoor plants on consumers”, Environment and Behavior, Vol. 49 No. 7, pp. 814-844.

Wallet, G., Sauzeon, H., Florian, L. and Bernard, N.K. (2013), “Virtual/real transfer in a large-scale environment: impact of active navigation as a function of the viewpoint displacement effect and recall tasks”, Advances in Human-Computer Interaction, Vol. 2013, pp. 1-7, doi: [10.1155/2013/](https://doi.org/10.1155/2013/879563) [879563](https://doi.org/10.1155/2013/879563), Article ID 879563, (accessed 22 April 2020).

Yildirim, K. (2013), “Bitkilerin iç mek^an kirleticileri uzerindeki€ etkileri” (The effects of plants on interior space pollutants), I\_ çmimar Dergisi, Vol. 28, pp. 107-115, (in Turkish).

Yildirim, N.N. (2018), “The effects of living walls on users at the commercial interiors”, Journal of Strategic and International Studies, ISSN 2326-3636, Vol. 13 No. 1, pp. 95-105.

Yildirim, K., Ayalp, N., Aktas, G.G. and Hidayetoglu, M.L. (2014), “Consumer perceptions and functional evaluations of cash desk types in the clothing retail context”, International Journal of Retail and Distribution Management, Vol. 42 No. 6, pp. 542-552.

Yildirim, K., Cagatay, K. and Hidayetoglu, M.L. (2015), “The effect of age, gender and education level on customer evaluations of retail furniture store atmospheric attributes”, International Journal of Retail and Distribution Management, Vol. 43 No. 8, pp. 712-726.

Yıldırım, K., Hidayetoglu, M.L., G€okbulut, N. and Muezzino€glu, M.K. (2019), “Effects on students’ perceptual evaluations of the wall colors used in design studios by the virtual reality method”, ICONARP International Journal of Architecture and Planning, Vol. 7 No. 1, pp. 99-120.

Corresponding author

Kemal Yildirim can be contacted at: [kemaly@gazi.edu.tr](mailto:kemaly@gazi.edu.tr)

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgrouppublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com