Research Paper

Identifying the Preferred Design Factors of the Shared Content in Online Shopping Environments of Instagram

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Abstract

Today, people are living in an immense world that contains the co-occurrence of the real world and the digital world. Since the quality of the shopping environment in the real and digital world plays a significant role in users' preferences, the shopping environment's design, even in the digital world, is important. The current study identified 51 images of shopping environments (clothing boutiques) published from 2019 to the end of 2021 on 8 architecture-related Instagram pages, with more than one hundred thousand likes. By using a quantitative-analytical method of content analysis and image coding, the present study examines the amount of "materials, lighting, showcase, form and seating types, colours and space configuration" as physical factors affecting Instagram consumers' preferences in shopping environments. The results show that clothing racks, hidden lighting, Stone and plaster materials, sharp-edge forms, puffs, and coherence (spatial configuration) are preferred by Instagram consumers. Examination of the average HSV of the selected images indicates a high Value and low Saturation of colours. The average Hue of the images is 89.66 °. The average RGB also indicates the average concentration of the green colour spectrum (consumers' preferred hue). The identified effective factors in the interior design of digital stores, can increase consumers' preferences and provide insights for future online digital shopping environment management.

Keywords: Digital stores, Instagram, Image coding, Interior design, Shopping environment, Users' preferences.

INTRODUCTION

The widespread use of the online digital world through web-based technologies and applications has been greatly facilitated over the past few years (Pelletier et al., 2020; Rukanova et al., 2020). The flexibility of global access and usage has led to the sudden growth of social networks and the emergence of a variety of digital and virtual activities offers a host of new opportunities and challenges to enrich this experience (De Freitas et al., 2010). On the other hand, the Covid-19 epidemic accelerated the need for a more realistic digital world, with the necessity for better places to live (Gene, 2020). In this way, the digital world environment, as a futuristic evolution of the "new normal life", integrates and meets our real-life needs and activities with online experiences (Maturana et al.,

2021). Given the scale of the impact of virtualization on our lives, architects must demonstrate their support for this digital environment revolution by accepting this challenge (Dokonal et al., 2021). People now live in a vast world that includes the coexistence of the real world and the digital world (Barhorst et al., 2021), therefore, in addition to the importance of designing real environments, online digital environments' design has also attracted the attention of many designers (Clements-Croome, 2005; Hong et al., 2019). Although the digital world is shaped by the real world (Bartle, 2004), the nature of this environment is fundamentally different from the one in the real world (Bourdakis & Charitos, 1999); In such a way that all architectural elements are uniquely important in the design process of the virtual environments and can be purposeful and functional as well, which require

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extensive studies to identify the role of architectural design in the digital environment (Koutsabasis et al., 2012; Moneta, 2020).

Social interactions (Leidner et al., 2018), e-learning (Salloum et al., 2019), and e-commerce (Bawack et al., 2022; Goraya et al., 2021; Yadav & Rahman, 2018) are among the most important and popular online activities and social networks, in the meantime, online shopping has gradually shifted from "a new method" to "a conventional one" (Zhang et al., 2017). Now, despite online shopping in the digital world and social networks, real stores still maintain their place in human lives and continue to have their physical and objective nature. Given the fact that shopping environment quality plays an important role in users' preferences and influences their purchasing decisions (Rastgar & Shahriari, 2018), the need to pay attention to the visual preferences of people in indoor and outdoor environments, has attracted the attention of researchers in recent years and has also been widely used in architectural designing (Farboud & Shahhoseini, 2020; Mousavi Samimi & Shahhosseini, 2021). In this regard, the importance of designing digital shopping environments in order to better align with or influence customer preferences has become more prominent. One of the most widely used theories in the field of visual preferences is Kaplan's Information Processing Theory (Kaplan et al., 1989). Kaplan's preference matrix is a perceptual approach that evaluates landscape aesthetics and consists of four variables: "coherence", "complexity", "legibility" and "mystery" (Lee & Kozar, 2009; Shahhosseini et al., 2015) (Table 1).

The Impact of the Shopping Environment on Users' Preferences

Store environment affects shopping pleasure (Pinto et al., 2020), time and money spent (Hussain & Siddiqui, 2019), and proper product placement reduces search time (Helmefalk & Berndt, 2018). Numerous studies on the relationship between the shopping environment and users' behavior indicate the positive impact of the environment on brand trust and positive evaluation of the store (Chang & Chen, 2008; Chuchu et al., 2018; Dholakia et al., 2010; Lin & Lee, 2012). The appearance and initial image of stores, especially retail stores, greatly shape the early preference of people to enter the store (Thang & Tan, 2003).

The shopping environment consists of physical factors such as lighting (Şener Yılmaz, 2018), color (Yi & Kang, 2020), material (Lin et al., 2020),

showcase (Vieira, 2010), form (Krolikowski et al., 2020) and seating types (Hami et al., 2018), which have a direct impact on users' perception of the store environment and affects their preferences. Proper lighting in the store leads customers to the goods and creates a positive feeling in them. From the buyers' point of view, clean and attractive stores have a positive social impact on them (Alsaleh et al., 2020; Areni & Kim, 1994), and the type of interior design affects their desire to stay (Renata, 2021). Also, warm colors are preferred over cold colors in stores (Yildirim et al., 2015). Regarding the arrangement of goods, users prefer displaying in the form of hanging to folding and do not like the goods to be hidden in storage (Wu et al., 2017).

Research Purpose

Due to the centrality of images on Instagram, this social network provides an opportunity for architects and interior designers to present their designs and understanding the content of these images is very important (Hu et al., 2014). Therefore, the purpose of this study is to identify the factors affecting the preferences of social media users (Instagram) in the interior environments of boutiques using the quantitative-analytical method. Initially, by studying related research, "materials, lighting, showcase, form, seating and colors" were identified as physical factors affecting users' preferences in shopping environments (Table 2).

Materials used in walls, ceilings and floors are classified and studied into six categories of "brick, steel, stone, plaster, wood and concrete", lightings are studied into three types of "ceiling, wall and hidden", and colors are analyzed in terms of HSV and RGB. HSV is the color brightness, color saturation, color type and RGB are primary colors (red, green, blue). Seating is studied in four categories of "sofa, chair, puff, stool", Showcases are classified and examined in four categories of "shelves, tables, mannequins and clothing racks" that are in the public view, and forms are studied from two perspectives of having sharp and circular edges. In the next step, by assigning spatial configuration factors (legibility, coherence, complexity, mystery) to the selected images, their relationship with the effective physical factors (Material, color, lighting, showcase, form and seating types) is identified.

Table 1. Definitions of information processing theory variables (Kaplan et al., 1989)

Variable	Definition
Legibility	It is clear when I can go in.
Coherence	Each component is well related to each other.
Complexity	The scene has too many distractions, making it confusing.
Mystery	The scene makes me feel there is something interesting to explore.

Table 2. Study variables

Category	Subcategory	Reference
Physical factors		
Material	Brick/ Steel/ Stone/ Plaster/ Wood/ Concrete	(Ibrahim & Ibrahim, 2020)
Lighting	Hidden (Cove, Recessed Lights)/ ceiling (Chandelier)/ wall	(Du, 2019; Janahi et al., 2021)
Showcase	Shelves/ Tables/ Mannequins/ Clothing Racks	(Vieira, 2010)
Seating	Sofa/ Stool/ Chair/ Puff	(Hami et al., 2018)
Form	Round edge/ Sharp edge	(Krolikowski et al., 2020)
HSV	Hue/ Saturation/ Value	(Zailskaitė-Jakštė et al., 2017)
RGB	Red/ Green/ Blue	(Yi & Kang, 2020)
Spatial configuration	Legibility/ Coherent/ Complexity/ Mystery	(Kaplan et al., 1989)

RESEARCH METHOD

Step 1: Selection of Instagram Pages

Although in some studies conducted via Instagram, the sample size is selected through hashtags (Rahardjo, 2018), given the extent of Instagram content in relation to the present topic, it was decided to select the sample size (pages) based on followers number and compatible content (Thömmes & Hübner, 2018). Among the pages with architectural content, pages with at least 300,000 followers were selected to ensure an acceptable number of users (Table 3). The study sample was intentionally limited to highly followed professional architecture-related Instagram pages to capture preferences within a design-savvy audience. This group is recognized for its influence on broader design trends, which can subsequently impact general consumer preferences. While this approach provides valuable insights, it is important to note that the results are specific to this audience and may not represent the preferences of the broader population of Instagram users.

Step 2: Filtering of Posts

Then from the content shared on the selected pages from 2019 to the end of 2021, posts related to clothing stores and boutiques (real or modeled), with captions and labels for clothing stores and boutiques, which had over a thousand likes were collected (51 posts).

Step 3: Development of the Coding Framework

The coding framework was designed based on thematic literature to systematically analyze the physical and visual elements present in the images. Six primary categories were identified: materials (e.g., stone, plaster, brick), lighting (e.g., hidden lighting, ceiling lighting), color (analyzed using HSV—Hue, Saturation, Value—and RGB—Red, Green, Blue), showcase design (e.g., clothing racks, mannequins), form (e.g., sharp-edged or curved), and seating types (e.g., puffs, stools, chairs). These categories were defined to capture key elements that influence user preferences in shopping environments. The framework provided a standardized approach to ensure consistency in the coding process, enabling a robust and reliable analysis.

Step 4: Image Coding Process

The selected 51 images were analyzed by systematically assigning visual elements to the predefined categories from the coding framework. The process was conducted manually to ensure the accurate identification of elements, with each image carefully examined to assign relevant codes. To maintain clarity, coding rules were established, and ambiguous cases were discussed among the research team. Sample-coded images were prepared and included as supplementary material to illustrate how the coding framework was applied.

Table 3. Selected pages from Instagram for study

	Instagram account username	Follower number	Related posts number
1	d.signers	4,300,000	*1 post*
2	designboom	3,900,000	*3 posts*
3	archdaily	3,400,000	*1 post*
4	dezeen	3,200,000	*6 posts*
5	interiordesignmag	3,100,000	*4 posts*
6	architecture_hunter	3,000,000	*1 post*
7	yellowtrace	529,000	*13 posts*
8	framemagazine	357,000	*22 posts*
	Total		*51 posts*

Step 4: Expert Evaluation

To further analyze spatial configuration factors, a group of 13 experts, including architects and interior designers, reviewed each image. Using Kaplan's Information Processing Theory, the experts assigned one of four spatial configuration factors—**coherence, complexity, legibility, or mystery**—to each image. The definitions provided in the study's framework (Table 1) guided this evaluation. Only images for which all experts reached unanimous agreement on the assigned factor were included in the final analysis. This step ensured the validity of the spatial configuration assignments and added a deeper dimension to the analysis.

Image analysis and coding

Image analysis, as a popular method in qualitative research and complementary to quantitative research, has its research advantages (Gotschi et al., 2008) and is a valid and important method in the research process in various fields. In the present paper, the coding method was used for analysis, which is executed by assigning image elements to descriptive categories (Tiggemann & Zaccardo, 2018). The classification of the codes, which depends on the relationship between the image and the background, must be clearly discernible and defined in the sample images.

In this study, the classification of codes was based on the study of thematic literature (material, color, lighting, showcase, form, and seating types) and the presence of codes in all images was investigated. Then, the average percentage of categories and subcategories of each (except color) was calculated using SPSS 22 descriptive statistics. Color analysis of images in terms of HSV (Hue, Saturation and Value) and RGB (Red, Green, and Blue) was done through Adobe Photoshop 2021 software by calculating the average of each factor.

RESULTS

Identification of the preferred physical factors of boutiques by Instagram users

The results of descriptive statistics for all categories examined, lead to the identification of factors affecting Instagram users' preferences regarding the indoor environment of boutiques. In terms of showcase, clothing racks (78%) are the most and mannequins (16%) as the least influential factor, and for lighting, hidden lighting was present in most images (76%) and wall lighting was in only 4% of images. Stone (76%) and plaster (74%) were identified as the most used materials and brick (6%) was the least used material. In relation to the most used form type, sharp-edged forms were present in 86% of the images. Among the types of seating, puffs (22%) were preferred the most, and stools (4%) were preferred the least when compared to other types.

The saturation and value of colors have a range of 0 to 100 and the hue of colors has a range of 0 to 360 degrees (color wheel). The results of the HSV mean of the selected images indicate high color value (m: 63.26) and low color saturation (m: 19.16). The average hue of the images is 89.66 ° which, is in the range of cool colors: green-yellow (90 °). The RGB range is between 0 and 255 and indicates the concentration of the main colors (red, green, blue), so that 0 indicates the lowest and 255 indicates the highest concentration. The obtained averages show the red color spectrum as the colors with the highest concentration (m: 156.28) and the blue color spectrum as the colors with the lowest concentration (m: 136.38). Considering green as the most used hue, the concentration of its color spectrum in RGB is moderate (m: 147.46) (Table 4).

Table 4. Percentage of subcategories detected in the images

Category	Showcase				Lighting		
Subcategory	*Shelves*	*Clothing Racks*	*Tables*	*Mannequins*	*Hidden*	*Ceiling*	*Wall*
Percent	52%	78%	60%	16%	76%	58%	4%
Category	Material						
Subcategory	*Brick*	*Steel*	*Stone*	*Plaster*		*Wood*	*Concrete*
Percent	6%	26%	76%	74%		30%	42%
Category	Seating				Form		
Subcategory	*Sofa*	*Stool*	*Chair*	*Puff*	*Round edge*	*Sharp edge*	
Percent	12%	4%	6%	22%	42%	86%	
Category	Color						
	HSV			RGB			
Subcategory	*Hue*	*Saturation*	*Value*	*Red*	*Green*	*Blue*	
Mean	89.66	19.16	63.26	156.28	147.46	136.38	

Identification of the Preferred Spatial Configuration of Boutiques by Instagram Users

After assigning spatial configuration factors to each of the selected images by a group of experts, the results of descriptive statistics show that Instagram users' preferences are inclined towards coherence (37.7%) and that mystery is the least preferred factor (15.7%) (Figure 1). Due to the fact that spatial coherence is more preferred, the physical factors of the images related to it were analyzed (Figure 2). The results show that in the images related to "coherence" (N: 19), the clothing racks are considered as the showcase of goods (N: 15), hidden lighting (N: 14), stone materials (N: 15), sharp-edge forms (N: 18) and use of puffs for seating (N: 5) were the most present factors identified.

In the case of HSV, there is only a noticeable difference in the mean value compared to the overall value, thus, the images related to "coherence" have a higher color brightness (m: 87.16) and in relation to RGB, the concentration of blue is higher (m: 156.16) (Table 5). Therefore, by applying the mentioned items in the design of digital boutiques and creating coherence in the environment, users' preferences can be influenced.

DISCUSSION

According to the results, Instagram social media users prefer clothing racks as a showcase for goods in shopping environments. In previous studies, researchers have emphasized the importance of clothing racks on buyers' behavior (Shangguan et al., 2015; Zhou et al., 2017), however, no study has examined the preferences of shopping environment showcase. In relation to indoor lighting, the preference for recessed lights, which is a type of hidden lighting (Hawkes et al., 1979), indicates that it is in line with the present study in terms of hidden lighting preference. The results of another study comparing pendant lights and recessed lights preference indicate an increase in people's preferences when using hidden lighting, especially in middle-aged people (Oi, 2005).

Among the materials used for the interior, people prefer natural-looking materials such as stone and brick to unnatural materials such as steel, but when compared to the results of the present study that indicate a greater preference for stone and less preference for brick, emphasis is on the need for a more detailed study (Burnard et al., 2017). It should be noted that the reason for the inconsistency of the results with previous studies could be the effect of climate (Oppong & Badu, 2012) and the prevailing materials in each city, on the preference of materials (Høibø et al., 2018).

A study that examined the effects of color in shopping malls in terms of saturation, confirms the results of the present study, demonstrating that most of the colors used in shopping malls have low saturation (Babin et al., 2003). Regarding the hue and value of colors, the preference for cold and bright colors has been proven in the past (Garth, 1924; Mohebbi, 2014; Mousavi Samimi & Sadraei Tabatabaei, 2022). Sharp-edge forms and the use of puffs in the interior environment of boutiques are preferred, but due to the lack of previous studies on the preferred form and seating space, it is not possible to compare the results. The results of the present study also indicate that the number of images related to coherence was more than other spatial configuration factors, suggesting coherence to be more preferred by Instagram users in boutiques, and in recent studies, the effect of spatial coherence on users' preferences in shopping environments has been shown (Hami et al., 2018).
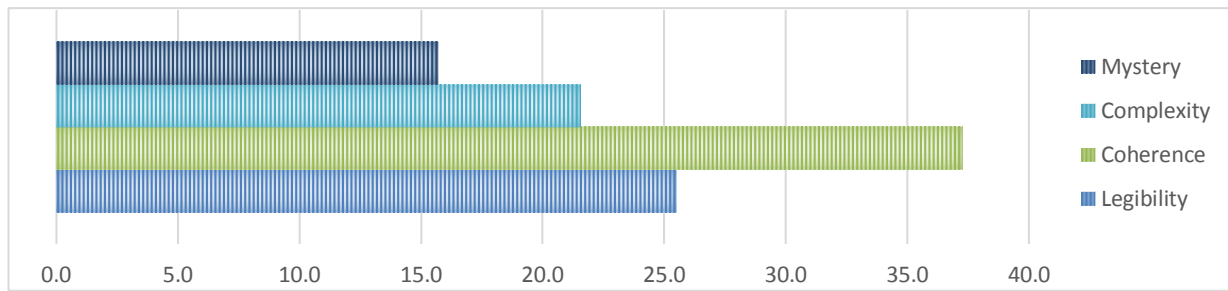
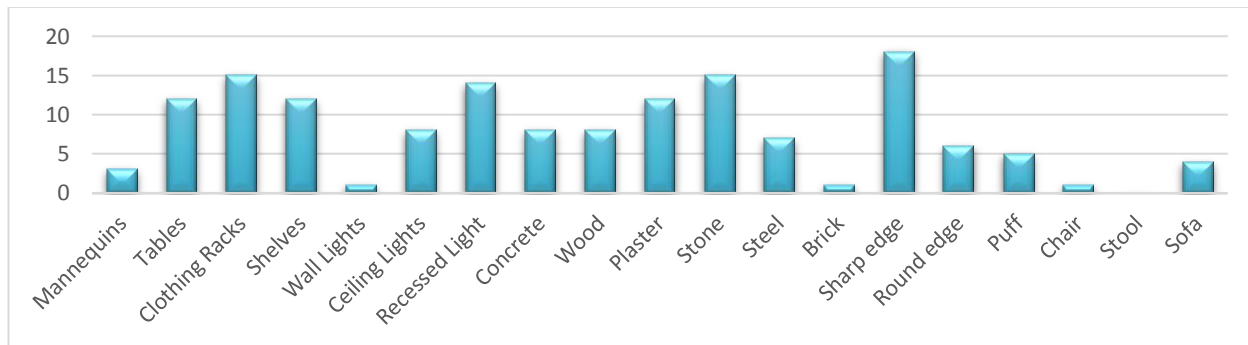**Fig 1.** Percentage of spatial configuration factors

Fig 2. Percentage of physical factors of images with coherence

Table 5. Average color factors in images with coherence

Category	Color					
	HSV			RGB		
Subcategory	*Hue*	*Saturation*	*Value*	*Red*	*Green*	*Blue*
Mean	62.74	17.79	87.16	136.95	147.16	156.16

CONCLUSION

In order to identify the factors affecting the preferences of social media users (Instagram) in the shopping environments (boutiques), after selecting the images preferred by users and coding them based on the extracted factors, the amount of each factor in the selected images has been calculated. The results of image content analysis indicate the orientation of Instagram users' preference towards clothing racks, puffs for sitting, hidden lighting, stone and plaster materials, sharp-edged forms and cool colors, greenish-yellow, with high brightness and medium concentration in the interior environment of boutiques, as well as the preference for coherent space configuration.

Due to the growing popularity of online shopping and the impact of store environments on users' preferences and shopping behavior, the need to pay attention to the design factors of digital store environments has increased. Therefore, paying attention to the environmental factors of stores and the

use of effective items identified in the interior design of digital stores can lead to an increase in users' preferences. By providing a suitable design strategy to owners of online digital shopping markets, the identified factors in this study can lead to the improvement of their business and have an impact on users.

Limitations and Future Studies

A key limitation of this study is its focus on professional architecture Instagram accounts. Engagement with posts from these accounts might be influenced by algorithmic visibility, professional networking, or niche preferences rather than broader user behavior. Future research could extend this analysis to include general Instagram users or followers of diverse online retail accounts, providing a more representative view of digital shopping environment preferences.

This study also focused on design elements derived from thematic literature, but it is acknowledged that

unrecognized variables, such as cultural differences or user demographics may have influenced the results.

Additionally, the current study only examines the preferences of Instagram users over a period of 3 years (2019 to the end of 2021), so Facebook, Twitter, and other social networks can also be examined in future studies. Pictures related to the interior of the boutiques were selected, thus, shopping malls and traditional markets are not included in the statistical population of the present study. By examining the identified factors in other shopping environments, researchers can add to the existing knowledge in this field.

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