

A STUDY OF DESIGN CHARACTER IN GREEN OFFICE INTERIORS

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Abstract. Green design as one of the important constituents of the sustainability concept, has recently become a preferred approach in the design of office buildings. Previous studies on the economic, ecological aspects and employee comfort/efficiency of green office designs with a rapid increase in number across the world, suggested the positive effects of the foregoing approach on both employees and the environment. Nevertheless, there are only a limited number of studies on the design character of green office interiors in the relevant literature. Accordingly, the present study aimed to examine the manifestations of design in green office interiors and discuss a less frequently addressed aspect of the green design, i.e., the design character. Therefore, the office buildings selected for the purposes of the present study were scrutinized on the basis of visuals and plans of the projects that were accessible to public. The results were suggestive of the fact that spatial organizations were designed upon a modular approach and with organizations that allowed flexible arrangements, that natural fabric and materials were in frequent use, that natural daylight played an important role in every design and that the human scale was attached importance in terms of dimensions.

Keywords: *Green office, green office interior, interior design, design character.*

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1. Introduction

Human activity has damaged the environment through several ways, including uncontrolled depletion of natural resources, environmental pollution and abnormal climatic conditions (Tu & Huang, 2015). Rapid growth in the building construction sector and widespread urbanization aimed to meet the increasing needs of the society have caused a massive exploitation of natural resources (Varma & Palaniappan, 2019). The adverse effects became more pronounced with the acceleration of industrial growth during the twentieth century, (Azizibabani & Dehghani, 2017) and certain concepts, including “green design”, “design for the environment” and “life cycle design” (Glantschnig, 1994) have emerged.

Defined as the theory, science and style of buildings, which are designed and built in compliance with environmentally friendly principles (Ragheb *et al.*, 2016), the basic idea of green design is to reduce environmental pollution, reduce energy consumption, recycle or reuse products and components and protect the environment (Hengli & Baoshun, 2011). This approach, which aims to minimize the impact on environment and provide a number of benefits (Abioso, 2020), is principally associated with a

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systematic and general understanding of all environmental effects that occur throughout the life cycle of the building and demands the improvement of environmental performances throughout each stage of the building life cycle (Abioso, 2020; Kostic *et al.*, 2015). Green design aims to prevent damage to the natural environment, which has been the habitat for human beings, as a result of interventions (Gobin, 2018) and thus has been the subject of various studies in economic as well as ecological terms (Wiley *et al.*, 2010; Bagheri *et al.*, 2018; Zhang *et al.*, 2018; Fu & Lyu, 2021). As a matter of fact, mitigating environmental risks and ecological issues are important elements of economic sustainability. In the context thereof, green design has a comprehensive perspective from the production, construction and use to the re-destruction of buildings.

The green design concept also represents a healthy and comfortable living space. It aims to improve human health by means of the design of healthy indoors (Allen *et al.*, 2015a). Accordingly, the goal of the US Green Building Council (USGBC) is not only to reduce the environmental impact across a building's life cycle, but also to protect the health of its occupants.

Green design approach in contemporary office buildings has increasingly become a focus of attraction due to its multifaceted benefits. This approach focuses on minimizing the undesired environmental impact of buildings with efficient use of resources, sustainable materials and thoughtful design practices. A review of green office designs' positive contributions to the environment suggests that green office design reduces the environmental footprint by encouraging the efficient use of resources, including water and energy. These designs incorporate renewable energy sources and energy-efficient systems, leading to lower greenhouse gas emissions, as well as promoting the use of sustainable materials and construction practices that reduce waste and encourage recycling (Gou, 2016; Zaid *et al.*, 2017).

From an employee wellbeing perspective, green office interiors often include natural light, better air quality, thermal comfort and ergonomic furniture that help improve the employee health and comfort. Furthermore, incorporating certain elements, including plants, green walls, vertical gardens and natural materials into the office setting can provide employees with improved access to nature, reducing stress and enhancing mental well-being. Previous studies suggested that workplaces, where green design criteria were observed, increased employee satisfaction, creativity and productivity (Abbaszadeh *et al.*, 2006; Gou *et al.*, 2012; Smith & Pitt, 2013; Caple, 2018) and were also more frequently preferred over conventional workplaces (Oyewole & Komolafe, 2018). Green office environments are associated with improved cognitive function and decision-making productivity and has a significant effect on learning and safety in employees (Allen *et al.*, 2015b; MacNaughton *et al.*, 2017) and as a result thereof employees are happier, healthier and more productive (Spengler & Sexton, 1983; Leaman, 1995; Lockwood, 2006; Singh *et al.*, 2010; Xue *et al.*, 2016; Geng *et al.*, 2017).

In addition, as regards corporate image and responsibility, companies or organizations with green offices are often considered more affirmatively by customers, employees and stakeholders and can therefore attract talent and investors, who particularly value environmental stewardship. Generation Z or colloquially the Zoomers, who were born between the years 1997 and 2012, prefer energy-efficient office buildings with sufficient daylight, high indoor air quality and comfortable temperatures (Wolf & Kluge, 2022).

In the light of above, green design approach towards office buildings represents a holistic approach that balances environmental, economic and social benefits and thus has become a critical consideration for modern architecture and corporate strategy. Focusing on sustainable practices and materials, companies can create healthier and more productive work environments and at the same time ensure positive contributions to the efforts aimed at to preserve our planet. Understanding the design character of green office interiors is therefore essential not only to achieve sustainability goals, but also to improve employee well-being, reduce environmental impact, create a positive corporate image and in the long run, attract environmentally conscious younger minds.

The design character of green office interiors represents a critical but underexplored aspect of sustainable architecture and interior design. While much of the existing literature has focused on the technical and functional aspects of green office buildings - such as energy efficiency, materials sustainability and environmental impact - there is a notable gap of research on the aesthetic, cultural and experiential domains of green office interiors. Naturally, green office presupposes not only a good spatial design, but also compliance to the technical and administrative requirements associated with a respectful, protective and sensitive posture regarding both the user and the environment in economic, social and physical terms. Notwithstanding above, the message that these spaces convey in terms of design is considered at least as important and worthy of research as regards sustainability.

Accordingly, the primary purpose of the present study was to review the design character of green offices based on design elements and principles and seeks to contribute valuable insights into the existing body of literature on sustainable office design. The study aimed to make inferences as regards the shared or different spatial design characters upon an analysis of different green office interiors selected based on certain criteria with a reference to the design elements and principles as defined by Ching and Binggeli (2017). By analyzing these characteristics systematically, this study aimed to investigate the commonalities and differences in spatial design among various green office interiors. This involved a detailed examination of selected offices that met specific criteria to ensure a representative sample. The study also aimed to highlight some good practices that could serve as guidelines for architects and designers, who aimed to create green workspaces vis-a-vis design parameters other than technical details. The study attempts at to enhance the understanding of how design elements and principles can be effectively applied to promote both green and aesthetic interiors in office environments, thereby enriching the theoretical and practical knowledge in the relevant field. Finally, the study aimed to provide a foundation for future research on green office design and offer practical recommendations that could be leveraged by professionals in architecture and interior design.

The methodology section below thoroughly delineates the criteria utilized for selecting the samples for analysis in the scope of the study, as well as the procedures employed for the analysis. The design elements and principles articulated by Ching and Binggeli, which serve as the foundational parameters for the analysis, are comprehensively detailed in the third section. The fourth section of the article consists of reviews of the sample offices, while the fifth section discusses the results derived from the analysis.

2. Methodology

The present study examined the green office interiors through the spatial design character and seeks an answer to the question of how green design was visually reflected in office interiors. Therefore, the office buildings selected for the purposes of this study were analyzed through visual analysis, a qualitative research method, through publicly available images and plans of the projects. These visual data were taken from Architect Magazine, Dezeen and Archdaily magazines as well as the architects' own websites. The projects were analyzed based on these visual data within the framework of design elements and principles that provided important clues about the aesthetic character and effects of the interiors. These data were then transferred to matrix tables and compared. After the completion of the study, the article was sent to the relevant architectural offices together with the visuals included in it and required approval was obtained for the use of both text and visuals. Descriptions about the elements and principles used in the study are given in Table 1.

For the purposes of the study, the offices were selected on the basis of four criteria:

- **Held LEED certification:** The LEED certificate, which is issued to determine how green or sustainable a building is, has been one of the internationally recognized certification systems that is most widely used in this field. For the purposes of the present study, an office with a LEED certificate was considered a “green office”.

- **Received multiple design awards:** Since the main goal of the study was to review the overall aesthetic qualities of the green office interiors, attention was paid to selecting projects that were not only sustainable but also spatially well designed. In that regard, it was required that the project in question was recognized in terms of spatial design by means of a design award.

- **Designed after year 2000:** The origin of green offices dates back to the environmental movement in the 1960s, yet the beginning of green building rating systems, which provided an objective and concrete manifestation of this movement in buildings, were introduced during the 1990s. For example, the first green building rating system known as the Building Research Establishment Environmental Assessment Method (BREEAM) was launched in the United Kingdom in 1990, where the Leadership in Energy and Environmental Design (LEED) started in the United States in 1998 (Isa *et al.*, 2013).

- **Designed by different designers:** Analyzing the spatial character of offices that both met the green office criteria and received design awards, the study reviewed projects of different designers at the same time period with an aim to identify different spatial setups. Accordingly, the purpose was to determine the differences and similarities as regards spatial character.

As a result, Hearst Headquarters and Zurich North America Headquarters were selected for the purposes of the study based on above criteria. All the two structures met the entirety of above-mentioned criteria.

Located in New York, USA, the Hearst Headquarters was completed by Foster + Partners in 2006. The interior design of the building was undertaken by Gensler. Built on top of a six-story building built in the 1920s, the office building owned by a media company is 79,500 square meters and has 44 floors.

Zurich North America Headquarters was designed by Goettsch Partners in 2016. With interior design undertaken by Cannon Design and located in Illinois, the building

belongs to a Swiss-based insurance company. Located on a 40-hectare plot, the building measures 783,800 square feet and has 11 floors. Study Management Scheme is given in Figure 1.

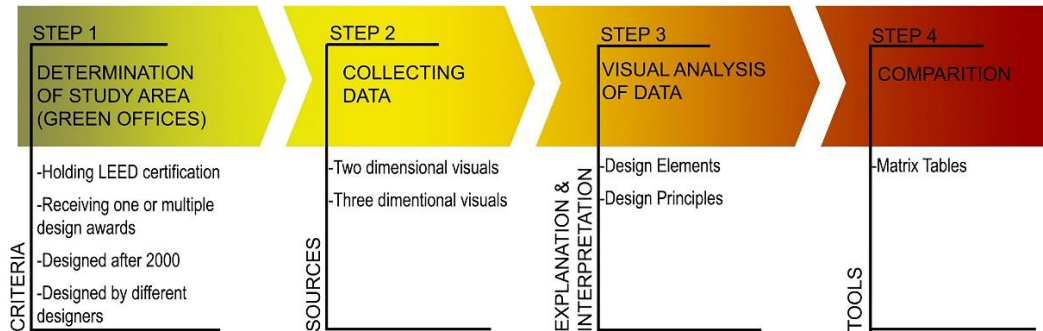


Figure 1. Study Management Scheme

3. Design Elements and Principles

Design elements and principles, as perpetual design tools, are at the forefront in determining the aesthetic character of a design. These elements and principles are used not only in making design decisions, but also in reading the existing design character (Adams, 2013). Together, the elements and principles provide important information about the appearance and content of the design (Kostic *et al.*, 2018). Indeed, learning about design character is a visual endeavour and these elements and principles are critical tools of architecture (Ching, 1996). Therefore, design elements such as form, shape, colour, texture and light and the principles of emphasis, rhythm, unity and diversity, harmony and proportion and scale in their combination were used and the green office interiors in question were analysed within the framework thereof. These elements and principles borrowed from Ching and Binggeli's (2017) Illustrated Interior Design book are briefly explained in Table 1.

Table 1. Explanation of elements and principles of design used in analysis

Design Elements	
Form	The shape and structure of objects, as distinguished from its substance or material. Primary elements (such as point, line, plane and volume), which differ vis-a-vis relative dimensions of length, width and depth-a matter of proportion and scale - are considered in describing the form. The form component was analyzed in two contexts: structural form and volume (void).
Shape	Shape is the specific configuration of the lines or planes that separates a form from its background or surrounding space. There are several wider categories of shape, including natural shapes, nonobjective shapes and geometric shapes. Shapes were analyzed in two contexts: vertical surfaces (walls, etc.) and horizontal surfaces (floor and ceiling).
Color	Color is a phenomenon of light and visual perception. It has three dimensions; i.e., hue, value and saturation. Colors were analyzed in the context of hue, value, saturation and also combinations.
Texture	Texture is defined as the visual and tactile quality of a surface beyond its color or form. Texture was analyzed in the context of rough-smooth, matt-glossy, hard-soft, etc. qualities.
Light	The intensity, color and direction of light and shadow. Light was analyzed as natural and artificial by its source and by intensity, color, direction and placement.

Design Principles	
Emphasis	Stress or prominence attached to an element of a composition by means of a perceptible contrast. Emphasis was analyzed in the context of exceptional size, exceptional shape, exceptional orientation, strategic positioning and a perceptible contrasting color or tonal value.
Rhythm	Rhythm can be described as a movement characterized by a patterned repetition, progression or alternation of formal elements or motifs in the same or a modified form. Rhythm, visual rhythm, vertical and horizontal rhythms, layered rhythms, foreground rhythm, background rhythm and contrasting rhythms, etc. were analyzed in the context of their types.
Unity and Variety	Unity and variety can be achieved upon sharing a common characteristic by means of the use of the same elements, while maintaining a variety of unique, individual traits and/or organizing a number of dissimilar elements in an arrangement composed of above elements in close proximity to one another. Unity and variety were analyzed in the context of orders, including unity by continuity, unity by size and variety, unity by continuity in orientation and layout and unity of opposites, etc.
Harmony	Harmony is considered the consonance or coherent agreement of elements or components in a composition. The principle of harmony was analyzed in the context of the balance created by the similarity or difference of elements with a common feature or characteristic, including shape, color, texture or material.
Balance	Balance is associated with symmetrical, radial and asymmetrical balancing of the visual forces reflected by the design elements. Characteristics that would improve or increase the visual weight of an element - and attract our attention - include: Irregular or contrasting shapes, bright colors and contrasting textures, large dimensions and unusual proportions and elaborate details. Balance, was analyzed in the context of symmetrical balance, radial balance, asymmetrical balance and symmetrical in itself, etc.
Proportion	Proportion is the relationship of one part to another or to the whole or between one object and another. Proportion was analyzed as to proportional order, modular proportions and dominance etc.
Scale	Scale is a specific proportionate size, extent or degree, usually relative to some known standard or recognized constant. Scale was analyzed in the context of visual scale, mechanical scale and human scale.

4. The Green Offices Analyzed in the Study

4.1. Hearst Headquarters

The building creates a visual emphasis with regard to structural form scale (Figure 1a). While the structural elements rise in the lobby with their large scale and angled view as rhythmic reflections of a contemporary image, the window openings in the background surround the main space with a regular rhythm as an expression of the traditional approach (Figure 1a). Thus, spatial harmony is achieved by the tension created by the contrast between the old and the new. The scale of the cross-oriented structural elements in the lobby is more dominant and unique compared to all the other design elements in this space. Both the material modules used on both vertical and horizontal surfaces and small-scale elements, including furniture create a contrast in this main space against the height emphasis of the load-bearing elements.

While the lobby rises six floors, creating a visual emphasis with its unique size, the large vertical space gives a rise to a symmetrical balance with other spaces of various sizes surrounding the lobby (Figure 1b). Those interior volumes are indicative of a modular layout despite variations as regards size. Especially the recurring

rectangular volumes on the upper floors are similar in terms of placement and orientation and in that regard, they form integrity through similarity.

A symmetrical balance is marked across the building, where horizontal planes dominate the vertical planes and the vacancy rate of the vertical planes is higher compared to their occupancy rate. This creates an open, spacious and airy atmosphere in interiors. The spatial dimensions of the office floors feature a modest scale that encompasses people. Those spaces do not substantially diverge from the human dimensions, despite they become narrow or expanded to accommodate individual or group work in line with functional needs. Furthermore, the lobby, which rises over six floors, is quite magnificent in terms of scale and is far greater compare to human scale.

Mostly geometric shapes are preferred in both vertical and horizontal planes in the interiors. The most important element that creates emphasis is the waterfall arranged diagonally in the lobby and the mural painting made of two different river muds (Figure 1c). Mostly rectangular shaped materials, tables and registers are seen on the vertical surfaces of the office floors (Figures 1d, 1e, 1f). Those elements, which regularly recur on those surfaces, create harmony with their similarities in terms of scale and proportion. While regular recurring linear shapes are seen on the ceiling plane, there are no figural elements on the floor plane (Figures 1d, 1e, 1f).

As regards the colors preferred in the interiors, particular natural colors of materials, including stainless steel and limestone are used and therefore, cold colors are dominant along with the beige color (Figures 1a, 1c). Although there is no prominent or accentuated color, the beige color is prevalent. Mostly a combination of pale and dark colors is preferred for the upper floors. In that regard, there is harmony provided by means of contrast in intensity (Figures 1d, 1e, 1f).

One of the most important textures of the building is the mural painting created by Richard Long using a mixture of mud from two different rivers (Figure 1c). Another striking texture is the moving texture around the stairs, covered with ceramic and glazed glass tiles, presenting a series of waterfalls (Figure 1c). Those textures give a rise to an elaborate, subtle sense of rhythm in the atrium. Although there are soft textures provided with certain materials, including carpets and fabrics based on relevant functions, the spaces on the upper floors dominantly feature smooth and shiny textures. Similar textures are regularly repeated (Figures 1d, 1e and 1f).

It is understood that natural daylight was attached special importance in Hearst Headquarters. The colors and textures in use are in a strong relationship with the natural daylight let into the interiors as well. For example, the natural light that generously illuminates the atrium enhances the visual impact of both the beige wall painting and the water wall in the interiors, creating an interesting shadow-light play (Figure 1c). In that regard, the light also reinforces the emphasis of the lobby space. Mostly recessed fluorescent fixtures are used across the office spaces on the upper floors (Figure 1d and 1f). Halogen strip lights and downlights were preferred in the executive floors and wall washers and downlights were preferred in the fitness floor along with those linear fluorescent strip cove lighting. Those spaces also receive natural daylight and shadows are generally soft as a result of ambient lighting preference.

Design elements and design principles relations for the Hearst Headquarters are also separately given in the matrix Table 2.

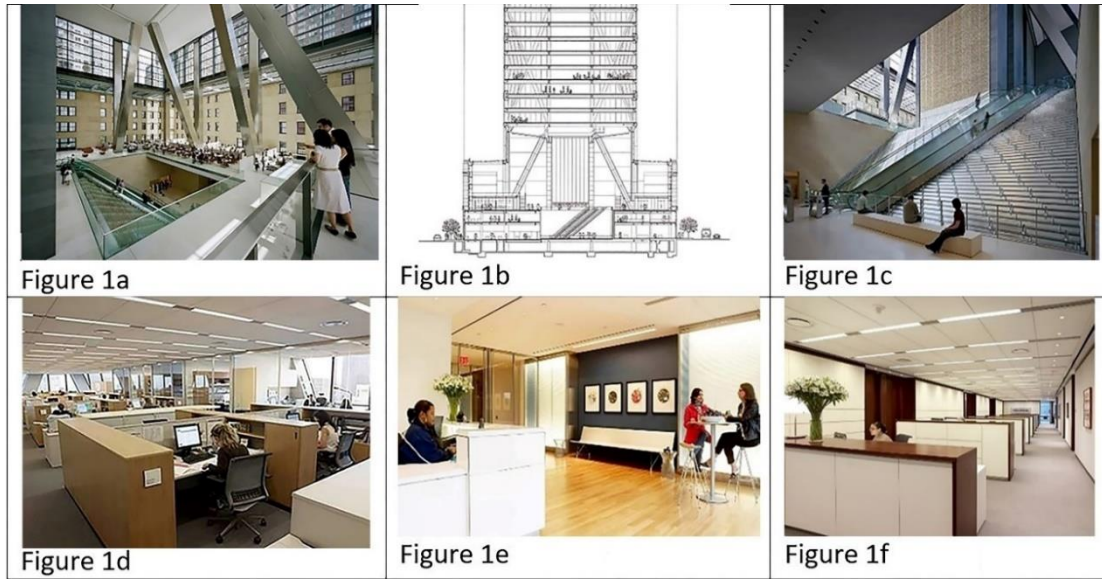


Figure 1(a-f). Hearst Headquarters Interior Images. 1a, 1c, 1d courtesy of Chuck Choi; 1b courtesy of Foster + Partners
Source for 1e: <http://kuglarning.com/portfolio-item/hearst-tower/> (Accessed on January 2023)
Source for 1f: <https://www.gensler.com/projects/hearst-tower> (Accessed on January 2023).

Table 2. Hearst Headquarters: An analysis based on design elements and design principles

	Emphasis	Rhythm	Unity and Variety	Harmony	Balance	Proportion	Scale
Structural Form	Emphasis by unique size	Background rhythm created by contrast in structural elements	Unity of opposites	Harmony by contrast in scale and shape	Symmetrical	New structural form dominates the old one across the first six floors	Large-scale new structural form across six floors
Volume (Void)	Emphasis by unique size (rising lobby)	Rhythm by alteration	Diversity by size, unity by continuity in orientation and placement	Harmony by similar orientations and placements	Symmetrical	Modular	Human scale (in offices, large scale in lobby)
Shapes on vertical planes (walls, etc.)	Emphasis by unique shape and size (shape in lobby in diagonal lines)	Rhythm by repetition	Unity by continuity	Harmony by similar geometries	Symmetrical	Proportional order	Human scale
Shapes on horizontal planes (floor and ceiling)	-	Rhythm by repetition on ceiling/no rhythm on floor	Unity by continuity of similar geometries	Harmony by similar geometries	Symmetrical in itself	Proportional order	Human scale
Color	-	Rhythm by alteration	Unity of opposites	Harmony by intensity contrast	-	Proportional order	Human scale

Texture	Emphasis by unique texture (mobile texture in lobby)	Rhythm by repetition	Unity by continuity	Harmony by similar textures	-	Glossy, smooth textures predominate over matte rough textures	Human scale
Light	Natural light	Rhythm by repetition in artificial lighting	Diversity in spot, linear, etc. lighting, unity by continuity	Integrity by similar characters	Light and shadow in balance	-	Human scale

4.2. Zurich North America Headquarters

The structural form is defined by linear elements. The structural form offers an open, clear and readable image thanks to the glass inner wall that rises from the floor to the ceiling and provide a clear view of the outside as well as the gallery spaces. Those structural elements, which are similar in itself in terms of scale and shape, continue with a regular rhythm. The glass façade, which provides a clear view of the outside and allows natural daylight to penetrate inside, also makes the proportional arrangement of these structural elements more visible (Figure 2a).

The building consists of three offset and stacked main “bars” in terms of volume and the gallery space located in the middle bar creates a dimensional visual emphasis, while those bars stacked on the top create an asymmetrical balance (Figure 2b). The building generally has an open plan layout with similarities in terms of arrangements and varies in size (Figure 2b). The proportional relationship between the spaces is based on an order in which the units consisting of rectangles expand and shrink, hence, indicative of a modular proportion. The ratios in-between the usage areas, circulation areas and gallery spaces in the building are also remarkable. For instance, the total ratio of circulation areas and gallery spaces in the right and left bars is almost equal to the ratio of the usage areas in both bars. Whereas, in the middle bar, the rate of usage area is higher compared to the rate of circulation areas. In terms of scale, a special importance is attached to the human scale in all the elements from the whole to the details in the building. Relevant examples include panels or other horizontal bands in the waiting areas, textural details used in ceiling and floor planes and decorative details placed at eye level (Figures 2c, 2d, 2e). Similarly, ceiling heights are in harmony with the width and length of the spaces. Office spaces are arranged based on functional requirements to accommodate working both on an individual scale and on larger group scale (Figure 2b).

There are linear repetitions in the space in terms of shape. Most prominently noticed over the glass façade, carrier system and lighting, those rhythmic shapes create a strong visual relationship and strengthen the character of the space (Figure 2a). The rhythm continues in the form alteration on vertical surfaces and in the form of repetition on horizontal surfaces across the spaces outside the lobby. The matching and/or overlapping shapes on the ceiling and floor surfaces are also remarkable (Figure 2d).

As in the previous office building in question, beige, a neutral color, is used here and enriched with the particular colors of natural materials. Earth tones are prominent as regards the color combination and especially beige and brown tones are in frequent use with regular repetitions. On the other hand, the blue color, which is used in harmony with the sky blue let in through the glass walls, creates a visual emphasis by

generating a contrast with the other colors in the space (Figure 2d). The use of pale colors and partially mottled colors with regular repetitions along with dark shades and the visual harmony between them also contribute in preserving the integrity of the design. Pale, dark and mottled colors evoke a sense of harmony through intensity contrast (Figures 2c, 2e and 2f).

As regards the texture preferences in the interiors, a varied but balanced distribution of combinations of hard and soft and glossy and matte textures is used. For instance, despite the fact that the textures feature a regular rhythm in themselves, the paint and/or composite materials are used on the ceilings and walls as opposed to the carpets that are frequently used on the floors, or glossy textures are used on the walls vis-a-vis the matte texture of the wood used on the ceiling and the carpet used on the floor (Figures 2d, 2e and 2f). That balanced diversity is visually marked with directional and grainy wood texture and textured ceramics. Another striking element in interiors is the vertical surfaces covered with ceramic and glazed tiles. Rhythm is visible both generally and in detail level (Figures 2c and 2d).

The natural daylight penetrating deep into the interior spaces, increases the visual impact of the spaces by revealing the potentials of the colors and textures in use. Generously filling the gallery space, the daylight also strengthens the emphasis of this gap (Figure 2a). Especially in office floors, the spot and linear artificial lighting used in addition to natural daylight in accordance with functional requirements, differ by device and direction depending on the layout of the space (Figures 2d, 2e and 2f). In addition to that diversity, various pendant lightings used in harmony with the ceiling movements in smaller interior spaces creating a visual accent specific to that space (Figure 2d).

The relationship between design elements and design principles for Zurich North America Headquarters is given in the matrix Table 3.



Figure 2(a-f). Zurich North America Headquarters Interior Images. 2a, 2c, 2d, 2e, 2f courtesy of Christopher Barrett Photographer; 2b courtesy of Goettsch Partners

Table 3. Zurich North America headquarters: An analysis based on design elements and design principles

	Emphasis	Rhythm	Unity and Variety	Harmony	Balance	Proportion	Scale
Structural Form	-	Rhythm by repetition	Unity by continuity	Harmony by similarity in scale and shape	Symmetrical	Modular	Human scale
Volume (Void)	Emphasis by unique size (gallery space)	Rhythm by alteration	Diversity by size, unity by continuity in placement	Harmony by similar placements	Asymmetric	Modular	Human scale
Shapes on vertical planes (walls, etc.)	-	Foreground rhythm in lobby; rhythm by repetition in offices	Unity by continuity	Harmony by similar geometries	Symmetrical	Proportional order	Human scale
Shapes on horizontal planes (floor and ceiling)	-	Rhythm by repetition	Unity by continuity of similar geometries	Harmony by similar geometries	Symmetrical in itself	Proportional order	Human scale
Color	Emphasis by color (sky blue)	Rhythm by alteration	Unity of opposites	Harmony by intensity contrast	-	Proportional order	Human scale
Texture	Emphasis by unique texture (wood and ceramic textures)	Rhythm by repetition	Unity of opposites (hard-soft/glossy-matte)	Harmony by contrast	-	Matte, rough textures predominate over glossy, smooth textures	Human scale
Light	Natural light	Rhythm by repetition in artificial lighting	Diversity in spot, linear, etc. lighting, unity by continuity	Integrity by similar characters	Light and shadow in balance	-	Human scale

5. Results

There are certain shared approaches as well as differing design decisions in the design of all two projects in question.

The structural forms are in a symmetrical balance in all the two projects. While rhythm was created by repetition in Zurich North American Headquarters, background rhythm was created by contrast in structural elements in Hearst Headquarters. Furthermore, the principle of diversity-unity was built on contrasts in the Hearst Headquarters example, where the same was achieved by continuity in the other project. This is also the case in the principle of similarity-harmony. Accordingly, harmony was achieved through contrast in terms of scale and shape in the Hearst Headquarters case, where in the other project, harmony was created by similarity in terms of scale and shape. As regards proportion and scale, although the structural forms in the first six floors of the Hearst Headquarters project dominated the legacy traditional forms and

presented a large-scale image, that proportional layout in the office floors offered a modular image aligned with human scale.

A unique emphasis was created in all the two projects with regard to volume. The emphasis was created in the Hearst Headquarters and Zurich North American Headquarters examples by means of unique size. All the projects markedly featured a modular layout, where recurring volumes with dimensional diversity by alteration rhythm was a common attribute. Another common attribute was that the human scale was considered. Especially in the office interiors, the ceiling heights were designed so as to encompass people. Although the perception of height changed due to gallery spaces in the Hearst Headquarters and Zurich North America Headquarters, both the furniture and the finishings in use in those spaces relatively reduced that perception. Spatial arrangements were made similarly in all two projects, allowing the user to make visual contact with other spaces and allowing flexible use instead of using isolated spaces. Arranged so as to provide a workplace both on an individual scale and larger group scale, the spaces provided an open, airy and spacious atmosphere. The relationship of design principle regarding the structural form and volume is given in Table 4.

Table 4. Relationship of design principle based on the form in the projects in question

		Emphasis	Rhythm	Unity and Variety	Harmony	Balance	Proportion	Scale
Structural Form	Hearst Headquarters	Emphasis by unique size	Background rhythm created by contrast in structural elements	Unity of opposites	Harmony by contrast in scale and shape	Symmetric	New structural form dominates the old one across the first six floors	Large-scale new structural form across six floors
	Zurich North American Headquarters	-	Rhythm by repetition	Unity by continuity	Harmony by similarity in scale and shape	Symmetric	Modular	Human scale
Volume (Void)	Hearst Headquarters	Emphasis by unique size (rising lobby)	Rhythm by alteration	Diversity by size, unity by continuity in orientation and placement	Harmony by similar orientations and placements	Symmetric	Modular	Human scale in offices
	Zurich North American Headquarters	Emphasis by unique size (gallery space)	Rhythm by alteration	Diversity by size, unity by continuity in placement	Harmony by similar placements	Asymmetric	Modular	Human scale

As regards the shapes of choice on vertical surfaces, the waterfall wall, as a distinctive shape formed by diagonal lines in the lobby of the Hearst Headquarters and the natural wall painting with its size created a visual emphasis. Despite the fact that there was no similarity in terms of rhythm in all the two projects, unity was achieved by continuity and harmony by similar geometries. The shapes had a symmetrical balance

in the Hearst Headquarters and Zurich North America Headquarters examples. The shapes aligned with human scale in all the two projects.

There is no prominent or accentual shape on horizontal surfaces. Similarly in all the two projects, those surfaces were in a symmetrical, proportional order and aligned with human scale. Zurich North America Headquarters had rhythm by repetition on both ceiling and ground planes, where Hearst Headquarters had rhythm by repetition only on the ceilings. Harmony was achieved through unity and similar geometries by continuity similarly in all the two projects, rectangular shapes replaced shapes that would emulate or were based on nature. Differed by content, those rectangular shapes, which were generally arranged in a simple and understandable order, with a regular recurring rhythm. The relationship between design elements and design principles regarding shapes is given in Table 5.

Table 5. Design principles relationships based on shapes in projects in question

		Emphasis	Rhythm	Unity and Variety	Harmony	Balance	Proportion	Scale
Shapes on vertical planes (walls, etc.)	Hearst Headquarters	Emphasis by unique shape and size (shape in diagonal lines in lobby)	Rhythm by repetition in offices	Unity by continuity	Harmony by similar geometries	Symmetric	Proportional order	Human scale
	Zurich North American Headquarters	-	Repetition rhythm in offices	Unity by continuity	Harmony by similar geometries	Symmetric	Proportional order	Human scale
Shapes on horizontal planes (floor and ceiling)	Hearst Headquarters	-	Rhythm by repetition on ceiling/no rhythm on floor	Unity by continuity of similar geometries	Harmony by similar geometries	Symmetric in itself	Proportional order	Human scale
	Zurich North American Headquarters	-	Rhythm by repetition	Unity by continuity of similar geometries	Harmony by similar geometries	Symmetric in itself	Proportional order	Human scale

Although there was no prominent color that created an emphasis in Hearst Headquarters, the sky-blue color creates a visual emphasis in Zurich North America Headquarters. In two projects preferred similar colors. Accordingly, pale colors expressing comfort, serenity and peace and dark colors that gave a feeling of depth and warmth were preferred in two projects. In all the two projects, rhythm was achieved by means of alteration. Harmony was marked with intensity colors in two. In terms of scale, the human scale was considered a basis the relationship between design elements and design principles regarding colors is given in Table 6.

Table 6. Design principles relationships based on color in projects in question

		Emphasis	Rhythm	Unity and Variety	Harmony	Balance	Proportion	Scale
Color	Hearst Headquarters	-	Rhythm by alteration	Unity of opposites	Harmony by intensity contrast	-	Proportional order	Human scale
	Zurich North American Headquarters	Emphasis by unique color (sky blue)	Rhythm by alteration	Unity of opposites	Harmony by intensity contrast	-	Proportional order	Human scale

As regards texture, Hearst Headquarters adopted the transfer of nature to the interiors as a texture. Those natural textures were manifest by the mural painting made of mud mixture of two different rivers in the lobby of Hearst Headquarters and the waterfall that turns into a living texture with the movement of the water. Wood and ceramic textures created a strong visual emphasis at Zurich North America Headquarters. Again, in the latter project, there was unity of opposites and harmony by contrast, while in Hearst Headquarters, unity was achieved by continuity and harmony by similar textures. Consideration of human scale in textures was a shared feature in all the two projects. The relation of design elements and design principles related to the textures is given in Table 7.

Table 7. Design principles relationships based on texture in the projects in question

		Emphasis	Rhythm	Unity and Variety	Harmony	Balance	Proportion	Scale
Texture	Hearst Headquarters	Emphasis by unique texture (mobile texture in lobby)	Rhythm by repetition	Unity by continuity	Harmony by similar textures	-	Glossy, smooth textures predominate over matte, rough textures	Human scale
	Zurich North American Headquarters	Emphasis by unique texture (wood and ceramic texture)	Rhythm by repetition	Unity of opposites	Harmony by contrast	-	Matte, rough textures predominate over glossy, smooth textures	Human scale

Natural light was one of the most important design parameters of all the two designs. In all two projects, highest level of access to natural daylight was prioritized, while distracting glare and harsh, sharp shadows were avoided by various strategies. Spot, linear, etc. lighting elements used for the purposes of artificial lighting were aligned with human scale. The relationship between design elements and design principles regarding light is given in Table 8.

Table 8. Design principles relationships based on lighting in the projects in question

		Emphasis	Rhythm	Unity and Variety	Harmony	Balance	Proportion	Scale
Light	Hearst Headquarters	Emphasis by unique texture (mobile texture in lobby)	Rhythm by repetition	Unity by continuity	Harmony by similar textures	-	Glossy, smooth textures predominate over matte, rough textures	Human scale
	Zurich North American Headquarters	Emphasis by unique texture (wood and ceramic texture)	Rhythm by repetition	Unity of opposites	Harmony by contrast	-	Matte, rough textures predominate over glossy, smooth textures	Human scale

6. Discussion and Conclusion

The present study focused on the design character of green office designs, the number of which is increasing rapidly around the world and two projects designed by different designers after 2000, which both held LEED certificate and design awards, were reviewed and the interior designs of these projects were analyzed within the framework of design elements and principles, an important approach in determining the character of a design.

Similar spatial arrangements were seen in all two projects analyzed. The flexible, adaptable and exploratory spatial layouts that became the norm in modern workplaces offer a dynamic and contemporary workspace. In addition to shared working areas, the foregoing dynamic and contemporary setup is also supported by social areas, where employees can interact outside of working hours, spend time together and exchange ideas with team spirit. Another remarkable situation in social areas is the visual emphasis created by size or shape in those areas. Those areas, which allow an overall perception of the design, provide a strong visual communication.

Mostly the rectangular shapes were included in the horizontal and vertical planes of the interior spaces in the context of shape. These shapes in an easily perceptible, quick-to-understand arrangement that offered a sense of integrity, provided a strong sense of rhythm in the interiors. Human scale consideration was a shared principle in all the two projects in terms of both form and shape. Indicative of a people-oriented approach, this principle is an important value allowing employees to communicate more effectively with their environment.

Strong ties were established with nature, in the design of all two projects in terms of color, texture and light and thus, nature was considered a design input in the design decision-making process. As a matter of fact, visual reminders of nature such as natural colors, natural materials and textures and natural lighting were used in interiors as the spatial manifestation of the aesthetic qualities offered by nature. For instance, in two projects, earth shades that provided a feeling of calmness, peace, depth and warmth were preferred. Again, while determining the tactile features, nature was inspired and certain natural characteristics were incorporated into interior design by means of mobile and living textures, including a waterfall, living wall, three-dimensional textures and wood. Similarly, access to natural light was prioritized and while the facades,

constituted a visual reminder of nature, sun created a dynamic light pattern as its angle changed.

The results of the study are also consistent with the principles of ecological design and biophilic design. For example, the use of environment-friendly materials on the floor, wall and ceiling surfaces, preference of natural and local materials in interior design, the use of colors that would evoke nature and have a positive effect on human psychology in interior design are all in line with the ecological design approach in the case studies in the scope of the study. The use of natural daylight, design strategies that reflect the feeling and experience of the passage of time, providing safe and sheltered environments that would allow visual connections between interiors, spaces and circulations that encourage mobility and a sense of security are in line with biophilic design principles.

In conclusion, the inclusion of natural elements and sustainable materials in green office interiors is in line with the broader goals of sustainable architecture, which seeks to balance environmental responsibility with human needs. The design characters of green offices embody aesthetic qualities in terms of the relationship of those offices with nature and furthermore, offer a novel approach towards the workplaces. Examples include the arrangements intended to include aesthetic needs that would contribute to the spiritual satisfaction of the individual and to add high value to their life style and to strengthen social relations and interaction among employees. In the context thereof, the design characteristics of green offices could contribute to the development of design approaches for contemporary offices. Thus, architects and designers can promote a healthier workspace setting by not only reducing environmental impact but also improving indoor quality of life.

Although the present study provides valuable information, it focused on a limited number of office buildings pursuant to selection criteria and copyright issues regarding the images. Nevertheless, the results of the study provides a basis for future studies. Future studies with a larger sample could provide a better understanding of the full diversity of green office designs. Additionally, common features of green office designs in different climatic regions can be investigated.

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