A PATTERN LANGUAGE FOR AN OFFICE DESIGN:
INTEGRATING HUMANE PATTERNS AND GREEN PATTERNS
IN AN OFFICE DESIGN

A graduate project submitted in partial fulfillment of the requirements
For the degree of Master of Science in
Family and Consumer Sciences

By

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Dedication

To the Lord, Jesus Christ, my savior, who loves me and leads my life;

to my beloved husband, Remon Aboudi, who encouraged me throughout the writing of the thesis;

to my father, Hanna Hazboun, and my mother, Amal Alghawi, who always support me with love and passion;

and to my brothers, Bishara Hazboun, Nabil Hazboun, and Yousif Hazboun, who have always been role models in my personal and professional life.

I love you all.
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ABSTRACT

A PATTERN LANGUAGE FOR AN OFFICE DESIGN:
INTEGRATING HUMANE PATTERNS AND GREEN PATTERNS
IN AN OFFICE DESIGN

By
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Master of Science in
Family and Consumer Sciences

The purpose of this graduate project is to propose a pattern language for workplace design as a method to create a humane and sustainable work environment for employees. Many builders, architects, and designers are using an incomplete and inefficient design process, and they often are contributors to the health and environmental problems in the work environment.

Modern designs and the build environment are governed by business owners’ attitudes about money, mass production, schemata, and images; they are less in touch with the environment and its users. Most work environments today are lacking in applying humane and sustainable patterns in the instrumental, aesthetic, and symbolic dimensions of office designs. At the same time, some designers do not know how to create humane patterns or apply them.

It is important when planning or designing a work environment for designers to have the option of using a design method that incorporates humane and sustainable patterns. Therefore, a design program that integrated humane patterns with green patterns was developed for a retail business, creating an office environment responsive to
employees’ needs and reflecting the culture of the organization.

The needs of the employees were examined as well as the culture of the organization. Sonic Electronix strives to become the first online shopping destination in particular for car electronics and also for other consumer electronics. Sonic Electronix features a casual and flexible culture; however, the work environment—with its dull traditional cubicles—does not reflect the culture of the organization. Sonic Electronix’s owner aims to increase collaboration, but the office environment does not support flexible teamwork. The employees addressed major concerns regarding space layout and the limited space in the break rooms and conference room. Employees also mentioned that the office furniture is not comfortable and that the office space is dull and not welcoming.

The pattern language and the schematic design proposal were evaluated by three experts in the field who are specialized in pattern languages. Discussions and suggestions were made by the experts. Implications of these suggestions were identified, and the process was further refined.
CHAPTER I

INTRODUCTION

An ordinary language like English is a system which allows us to create an infinite variety of one-dimensional combinations of words, called sentences. . . . A Pattern Language is a system which allows its users to create an infinite variety of those three-dimensional combinations of patterns which we call buildings, gardens[,] and towns.

Alexander et al., 1979, pp. 185–186

The nature of work in the United States is fundamentally changing. Work is becoming increasingly knowledge based and more complex as it is dependent on collaborative social skills and team-based technological capability, all while increasingly more time pressured. The changes in work structure have forced organizational strategies to become leaner, more tuned to dynamic competitive requirements, and less hierarchical in structure. The changes in organizational structures require the work environment to adapt to fast changes in structure without changing the physical setting of the workplace. However, there is scant recognition in organizational and management fields of the business value of space and its positive impact on employees’ productivity and comfort.

At the same time, in the professional field of design, architects and interior designers are facing problems with designing humane and sustainable work environments responsive to employees’ needs. Modern designs and the built environment are governed mainly by business owners’ attitudes about money, mass production, schemata, and images and less in touch with the work environment and its users.

Therefore, the main aim of this graduate project is to create a design program that will integrate humane patterns with green patterns responsive to employees’ needs and
reflect the culture of the organization.

Statement of the Problem

In the United States, the practice of work has fundamentally changed over the past 20 years to become more knowledge based. Knowledge-based work is more cognitively complex, more dependent on social skills, and more time pressured. Knowledge-based work tends to be more team based and collaborative, which encourages business owners to change organizational structures that govern that work. Organizations are becoming less hierarchical in structure, more attuned to competitive requirements, and more focused on customer perspective (Chan et al., 2007). At the same time, the demographics of the workforce are changing as the age diversity of the workforce increases. Different generations of workers co-exist in the workforce today, from Baby Boomers who are staying longer to younger generations who bring diverse values and expectations to their work. The changes in the organizational structures and strategies produce consequences not just for how the work is done but also for the workplace environment and the employees (Chan et al., 2007; Kampschroer, Heerwagen, & Powell, 2007).

There is scant recognition in the organizational and management fields of the business value of space and its impact on employees’ productivity. Business owners recognize that the structure of work is changing, but techniques for using space as a tool for affecting and inspiring work are neither taught in business schools nor applied in the physical office settings. Therefore, some business owners do not seem to evaluate the workplace physical environment even if they are changing business strategies such as having a flexible and open work culture or being less hierarchical in structure and decision authority (Kampschroer, Heerwagen, & Powell, 2007). On the other hand, some
business owners will only use organizational framework models to create a work environment that would represent the culture of the business—without focusing on the users’ needs. In this case, the process of designing the new workplace is driven directly by the owners and the top managers of the organization. This top-down approach to create office environments is not conducive to employees’ needs and adversely affects their productivity (West & Wind, 2007).

Furthermore, the current design processes are governed by the striving force for originality, compelling a type of mechanical imposition of grid-like arrangements on building shapes, a procedure that does not preserve the environment or its beauty. Some design processes are governed by profit and greed; forcing designers to think about what pleases the business owners instead of understand users’ needs and listen to their feedback (Alexander, 2002, pp. 116, 235). According to Alexander (2002), designers are building fabricated designs, cookie cutter designs that do not have the opportunity to be modified or adjusted to the difficulties and realistic perspective of the place or the needs of its users.

Therefore, there is a lack of a constructive design framework that would integrate humane patterns with green patterns in an easy and legible manner for interior designers and architects to create office environments with humane and sustainable qualities (Chan et al., 2007; Pontikis, 2010). Such a framework will help design professionals work with employers and employees to create office environments that support all of their needs.

**Purpose of the Study**

The purpose of the project is to put forth a pattern language for an office environment that would integrate humane patterns with green patterns in an easy and
legible manner. The pattern language could possibly be used by interior designers and architects in an effort to create humane and green workplaces. Such a design tool could be used by design professionals with business owners and their employees in an effort to create an office environment to support employees’ needs and at the same time address company goals. This design tool will also help business owners understand the importance of designing a healthy, sustainable, and effective office environment that would affect employees’ satisfaction and productivity.

**Research Process**

The design study started by a visit to Sonic Electronix, a retail store in Los Angeles, California. Observations were made of the different work environments and the ways that working personnel utilized the spaces. Observing what worked and what did not work in various spaces allowed for a better understanding of employees’ needs, the physical setting of the work space, and its impact on achieving higher work efficiency and better interaction among employees.

The owner of Sonic Electronix approved conducting detailed site analysis for Sonic Electronix, located at 28340 Ave Crocker, Suite 202, in Valencia, California. (See Figure 1.1. for the structure of Sonic Electronix, and see Figure 1.2. for map location of Sonic Electronix.)
The building already functions as an electronics retail store, but many of its spaces do not support employees’ needs in their work environment, and some areas do not reflect the culture of the organization. (Only certain parts of the existing building were examined such as the marketing department, etc.; see Figure 1.3 for the floor plan layout.)
Observations of the interiors and the way managers and working personnel utilized the space were noted. Surveys were given to the employees to understand their needs and retrieve feedback on the current work environment. In addition, informal interviews were conducted with the managers to understand the culture of the organization. Then, based on the site observations, surveys, and interviews, a draft checklist was prepared to help identify the humane and green design principles that could be applied to the office space.

The next step of the graduate project was to integrate humane and green patterns or simple rules that would support employees’ needs and reflect the culture of the organization by using Alexander’s design method of pattern language (Alexander et al., 1977). Alexander’s design method of pattern language describes the fundamental nature of making responsive and harmonious environments from the users of these environments. Each pattern represents a problem that occurs over and over in the environment and then describes a solution to that problem that can be used as a rule for creating harmonious environments.

The focus of this graduate project was to put together a constructive design framework that integrates humane patterns with green patterns based on the employees’ needs and the culture of the organization in an effort to create an improved work environment.

**Hypothesis**

If a pattern language with humane patterns and green patterns reflects employees’ needs and addresses a company’s culture, the pattern language can help interior designers and architects design workplaces with humane and sustainable qualities.

*Independent Variable:* A pattern language for humane and green workplaces
Dependent Variables: Employees’ job satisfaction and the company’s financial outcomes

Justification

Research suggests that employees are more aware of their work surroundings and are increasingly concerned about the impact of the physical setting on their health, safety, and work performance (Carnavale, 1992; Jamal & Adelowore, 2008). Also, interior designers are lacking a comprehensive design process that combines humane and green aspects of design in an effort to create office environments responsive to employees’ needs and feedback as well as preserve the surrounding environment.

Designers’ Responsibility

The aim of this graduate project is to put forth a pattern language for design professionals to work closely with business owners and their employees in creating a humane and sustainable work environment. It is the designers’ responsibility to create spaces that aim to improve the health and well-being of people. At the same time, this model will serve as a tool for business owners to understand the importance of creating a successful workspace environment that reflects employees’ needs.

Organizational Gain

Spatial design may project organizational identity by expressing values important to the organization, its fields of expertise, or its future growth. It may also contribute to organizational effectiveness by supporting employee satisfaction and morale. Research shows that employees included in the work environment planning process perceive that the organization extends loyalty toward its employees, which will likely increase employees’ job satisfaction. Increasing employee satisfaction will increase employee productivity, which will directly affect customer satisfaction and organizational gain.
Definitions

General Definitions

1. **Baby Boom** is a period of sharp increase in the birth rate as in the United States following World War II (*Webster’s Encyclopedic Unabridged Dictionary of the English Language*, 2001).

2. **Baby Boomer** is a person born during a baby boom, especially one born in the United States between 1946 and 1965 (*Webster’s Encyclopedic Unabridged Dictionary of the English Language*, 2001).

3. **Brownfields** are abandoned or underused industrialized locations that suffer from pollution. These locations cause communities to face environmental problems and lower property values (http://thegreendebateteam.wordpress.com/2011/03/12/from-brownfields-to-greenfields/).

4. **Formative evaluation** is evaluation during the development or implementation of a project/program to improve the project/program (*Webster’s Encyclopedic Unabridged Dictionary of the English Language*, 2001).

5. **Volatile Organic Compounds (VOCs)** are compounds that release harmful chemicals into the air. VOCs can be released from new carpeting and synthetic upholstery materials (Kopec, 2009, pp. 97–98).

Design Definitions

1. **Patterns**, according to Alexander (1977), describe problems that occur over and over again in an environment and then describe the core or the solution to the problems in such a way that these solutions can be used many times over without doing it the
same way twice (Alexander et al., 1977); simply other forms of documentation (Rising, 1998); it is also referred to as “design patterns.”

2. **Pattern languages** are design methods referring to structures of networks that identify common problems and solutions to planning and developing communities and buildings. This method was developed by noted architect Christopher Alexander and his associates over 30 years ago and was established in the book *A Pattern Language* (1977). It aims to provide a set of reusable solutions to common architectural design problems; it can be used over and over again to produce many different architectural designs (Zhao, Macaulay, Adams, & Verschueren, 2007).

3. **Sustainable environments** are defined by the United States General Services Administration as environments that seek to reduce harmful and negative impacts on the environment and create a healthy and productive environment for people, therefore improving the overall building performance.

4. **Cookie cutter designs** are fabricated designs made by the rigid rules and documents of design without adapting to the surrounding environment. These designs were not made to be modified or adjusted to the needs of their users (Alexander et al., 2002, pp. 186–187).

5. **Ergonomic furniture** is furnishings that can be adapted to individual physical characteristics and designed to reduce muscular strain, improving satisfaction with the work environment.

6. **Generative design process**, as defined by Christopher Alexander, is a step-by-step design process that describes what to do and what actions to take in order to make a building or space design unfold beautifully (2002).
7. **Green patterns** describe problems with the quantitative aspects of space such as building technology, construction, and materials. The primary aim of green patterns is to protect and preserve human health and the physical fabric of the environment (Pontikis, 2010).

8. **Humane patterns** describe problems with the qualitative aspects of space such as space design, function, and geometry. Each humane pattern relates to human feelings and sensibilities. The aim of humane patterns is to create livable environments that respond to people’s physical, emotional, spiritual, and cultural needs (Pontikis, 2010).

9. **Livable environments** are spaces responsive to human physical, emotional, social, and cultural requirements (Pontikis, 2010).

10. **Responsive environments** are settings that adapt to humans rather than vice versa and fulfill human needs. This adaptation to human needs often leads to positive physical health and increased psychological satisfaction such as comfort and happiness as well as overall work efficiency (Pontikis, 2010).

11. **Office landscape** is an entire floor of uninterrupted space with low ceilings and no partitions (Alexander et al., 1977, p. 690).

12. **Open office space** is an uninterrupted modular space with modular full-height or half-height partitions (Alexander et al., 1977, p. 690).

13. **Structure-preserving designs** are models somehow consistent with the surrounding environments and preserve their wholeness (Alexander, 2002, p. 52).

**Business Definitions**

1. **Collaborative work environments** are settings that accommodate and stimulate active and dynamic interactions and support the individual concentrated tasks needed for high
performance in cooperation (Hua, Loftness, Heerwagen, & Powell, 2011).

2. **Company cultures** consist of the values and norms that hold the organizations together and define how people work and think about work (West & Wind, 2007).

3. **Job satisfaction** is the pleasurable or positive emotional state resulting from the appraisal of the work environment and one’s job experiences (Danielsson & Bodin, 2008).

4. **Knowledge-based work** is a complex work dependent on team, social skills and collaborative technological capability (Chan et al., 2007).

5. **Work efficiency** is the reduction of undesired consequences from an action; it is also measured as the capacity to maintain individual satisfaction (Chan et al., 2007).

6. **Work effectiveness** is the attainment of a desired end product over and over again (Chan et al., 2007).

7. **Work environments** are stimulus fields with certain catalytic properties that permit some behavioral patterns to take place while restricting others (Carnevale, 1992).

**Assumptions**

In this study, the collected data from the survey questions for the employees and interviews with the managers of a small business are based upon the following assumptions:

**Primary Assumptions**

- Employees and managers participated in the surveys and interviews without pressure from researchers.
- Employees and managers were honest and freely expressed their needs without pressure from the business owner or head management.
- The business owner was open to using the pattern language in the current and
other company store locations.

- Experts on humane and green pattern language held the appropriate qualifications to evaluate the design program.

Secondary Assumptions

- Employees and managers understood the questions in the surveys and during the interview process.
- The design experts understood and completed the evaluation questionnaire form honestly.

Limitations

This project contributes to the importance of involving employees in improving and designing the work environment and to the integration of humane and green pattern language in the design process. However, certain limitations to the study exist.

- The research focused on employees of only a retail store in Los Angeles, which could limit the generalization of the findings.
- The proposed pattern language is geared towards only individuals who read and understand English.
- The proposed and revised pattern language was driven by a specific office environment and population. In that sense, it may need to be edited when used for a different population or environment.
- Due to time limitation, some humane and green patterns such as color and indoor environmental quality were not discussed in depth.
CHAPTER II

REVIEW OF LITERATURE

Organized work composes a large percentage of most individuals’ activities and constitutes a fundamentally important aspect of most people’s lives. As a result, work activities and experiences offer important implications for individuals’ psychological well-being, including their affective experiences at work and their off-work experiences and behaviors (Ilies et al., 2007). According to the National Longitudinal Survey of Youth 1979, the average person born in the latter years of the U.S. Baby Boom held 11 jobs from ages 18 to 44, with the majority of the jobs held before age 27. This survey followed 9,964 men and women aged 14 to 22 when first interviewed in 1979 and aged 43 to 52 when interviewed during the 2008–2009 period. These respondents were born from years 1957 to 1964, the latter years of the Baby Boom that occurred in the United States from 1946 to 1964.

Employment Statistics in the United States

According to the National Institute for Occupational Safety and Health (NIOSH, 2010), the American workforce is rapidly aging and is increasingly burdened by high levels of obesity, diabetes, heart disease, and depression. Middle-aged and young workers are facing earlier onset of chronic health conditions such as obesity and diabetes.

A U.S. Census Bureau Statistical Abstract of the labor force in the United States indicated that in 2009, the nation’s labor force included 139.8 million employed individuals. Of these, 4.8 million were young workers 16 to 19 years old. Thirty million of the total employed individuals were middle-aged workers from 25 to 34. On the other hand, 21 million workers were from 55 to 64, and 6.1 million were over 65 years old. On
an average, employed individuals worked 38 hours a week.

**Changes in Work Structure**

Work today is changing, increasingly knowledge based and thus more cognitively complex and more dependent on social skills and technological competence (Kampschroer, Heerwagen, & Powell, 2007). Due to changes in the structure of work, organizational strategies are changing: becoming leaner more focused on competitive requirements and identifying customer value. Organizations are less hierarchical in structure and decision authority (Chan et al., 2007; Hue et al., 2010). At the same time, the demographics of the work force are changing as the age diversity of the workforce increases. An increasing number of older adults are staying on the job beyond the traditional age of 65 or returning to the workplace. The majority of the Baby Boomers plan to continue working, often because many older people enjoy their work and are not enthusiastic about leaving it.

As work changes, the organizational structure changes, and the character of the workforce changes, the physical spaces in which work occurs must change as well (Chan et al., 2007; Kampschroer, Heerwagen, & Powell, 2011). However, little attention is paid to workplace design and the importance of understanding workers’ needs. Business owners generally ignore the effect of workplace design on employees’ job satisfaction and productivity (Chan et al., 2007; cf. Elsbach & Bechky, 2007).

**Work Environmental Challenges in the 21st Century**

Today’s work is becoming knowledge intensive and more focused on communication and collaboration. Workplace collaboration, an important element, is a system of behaviors that includes both dynamic interactions and uninterrupted time for
concentrated work. Facilitating both dynamic interactions and a distraction-free environment is a constant challenge in modern workplace design (Hue et al., 2011).

In modern designs, challenges include providing a workplace that can support the constant changing demands of the day-to-day as well as year-to-year contemporary work. At the same time, a work environment should support employees’ needs as well as reflect the culture of the organization (Chan et al., 2007).

The author will focus on the following humane work environment challenges: cookie cutter designs, office space layout, functionality, and respecting users’ needs. The paper also will address the following sustainable challenges: buildings’ high resources waste and space quality.

**Cookie Cutter Designs**

Today, modern designs have entered a new phase of creating cookie cutter designs that reflect an invention image, a conceptual picture of the reality in the mind of the professional designers without taking into consideration the needs of the users. Cookie cutter offices are simply mass-produced spaces that have low-quality characteristics for supporting user needs.

According to Alexander (2002), cookie cutter designs are fabricated by following rigid rules that present schemata and images instead of adapting to user needs. Cookie cutter designs can not be modified or adjusted to the difficulties and realistic perspectives of the places or the needs of their users. Instead, the modern built environment is governed by profit and mass production. Designers are forced to create office designs that would please business owners’ visions instead of understanding user needs or listening to their feedback during the design process (Chan et al., 2007). Cookie cutter office designs
exert negative psychological, behavioral, and social outcomes for employees—such as stress—especially when individual needs are thwarted (Rashid & Zimring, 2008).

**Office Space Layout**

The modern design process and its construction create drastic negative effects on the interiors of buildings and their components. Room configurations, wall angles, and space layouts become awkward assemblies of unrelated components and lack the necessary structure to make coherent humane and living designs, as they do not relate to the surrounding environment or support peoples’ needs (Alexander, 2002, p. 110).

In today’s office design, the nature of work has forced a change in the culture of business organizations, which affects office layout. Organizational culture is becoming less hierarchical and more focused on collaboration and uninterrupted time for concentrated work. Therefore, business owners communicate the less-hierarchical culture by creating an open environment that costs less in budget and allows flexibility to organizational changes and adaptation to the changes without the need for reconstruction (Hue et al., 2011; Danielsson & Bodin, 2008).

Many organizations that understand the benefits of open-plan settings for increased collaboration, however, ignore the negative effect of low levels of enclosure on worker concentration (Hue et al., 2011; cf. West & Wind, 2007). The open workspace layout may reduce employees’ sense of privacy and as a result reduce employees’ task performance, which affects the overall profitability of the organization.

At the same time, noise is considered a major concern in open office plans. Uncontrollable sounds generated by others or unpredictable sounds (e.g., telephone rings) cause stress to other workers. Telephones ringing and people talking in the background
have been cited most frequently as the primary sources of annoyance in offices. Exposure to uncontrolled noises in office spaces will cause employee discomfort, which decreases employee task performance. Noise interferes with efficiency on most tasks and may increase employee stress (Rashid & Zimring, 2008).

**Space Functionality and Users’ Needs**

In today’s modern world, business owners do not invest their organization’s money in creating the structure of the building or its interior spaces, which represent the organizational physical environment. Most knowledge-based organizations start their business in a building used for another type of work. Some organizations relocate to another office building because they are downsizing or expanding without adjusting the space layout to support the function of the business and its users’ needs (Hua et al., 2011; cf. West & Wind, 2007).

In modern office spaces, there is a lack of clear space functionality; for example, in some offices, the project room can be used for meeting purposes, which may affect employee needs. On the other hand, some offices have distinct functional spaces such as project rooms, conference rooms, storage spaces, break rooms, etc. but lack the proper circulation paths needed to connect all of the spaces together, which produces a negative effect on employee comfort and overall productivity (Peponis et al., 2007). According to Alexander (2002), good circulation paths are the links that connect areas or centers to one another in a given space. These links have the capacity to provide each center with proper support from the other areas or centers.
Sustainability

Most Americans spend up to 90% of their time indoors, and many spend much of their working time in an office environment (Fisk, 2000). Therefore, it is important to pay attention to the indoor environmental quality of the space through green design; however, green design focuses primarily on technology and not as much on user needs.

Some of the characteristics that relate to the indoor quality of a space would include the use of low-toxicity finishes and furnishings to result in better air quality, natural lighting for better quality of illumination, operable window treatments to enable personal control over ambient conditions and access to outdoor views, and recycled materials that could provide a more composed and aesthetically pleasing interior (Paul & Taylor, 2008).

Space Quality Concerns

According to the Occupational Safety and Health Administration (2011), indoor air quality (IAQ) is a major concern to today’s workers and building managers because it can impact the health, comfort, well-being, and productivity of building occupants. Poor indoor air quality has been tied to symptoms like headaches, fatigue, trouble concentrating, and irritation of the eyes, nose, throat, and lungs. Also, some specific diseases like asthma have been linked to specific air contaminants or indoor environments. Poor ventilation (lack of outside air), problems controlling temperature, high or low humidity, and other activities in or near a building are factors that affect the indoor air quality (Fisk, 2000).

Buildings’ High Resources Waste: Energy, Material, and Water

While office buildings provide countless benefits to our society, they also pose
significant environmental and health impacts. According to the 2003 Commercial Building Energy Consumption Survey (CBECS), nearly 4.9 million office buildings exist in the United States. Approximately 170,000 commercial buildings are constructed every four years. The CBECS also reported that commercial buildings accounted for 46.3% of the total U.S. energy consumption.

According to the Municipal Solid Waste Characterization Report, in 2007, the total industrial generated solid material waste in the United States was 186.11 million tons. There were 37.76 million tons of nondurable goods waste such as newspapers, office-type papers, and trash bags. The total waste in glass from durable goods (e.g., appliances and furniture) was 2.11 million tons, and there were 11.21 million tons of metal waste.

According to the report “Estimated Use of Water in the United States in 2005” by the U.S. Department of the Interior and the U.S. Geological Survey (2009), the total water withdrawal was 410,000 million gallons per day. California accounted for 11% of all withdrawals in the United States in 2005. The estimated industrial use of water, which includes office buildings, was 18,200 million gallons per day. In 2005, the industrial use of water in California was 95.7 million gallons per day. In conclusion, there is a lack of a design framework to assist designers and architects in solving the challenges of the work environment to create a humane and sustainable office environment.

**A Pattern Language**

Christopher Alexander is well known for his theories about design and building projects in California, Tokyo, and Mexico. His groundbreaking books such as *A Pattern Language* (1977) and *The Nature of Order* (2002) propose a more-scientific perspective
of the world and explore the concept of creating livable environments. Furthermore, they demonstrate how the patterns are key in the fundamental structures of creating livable environments.

According to Kohn Wendy (2002), a designer and writer on urban and architectural issues, *A Pattern Language* is among the most widely read architectural books of all time and is commonly called a design “bible.” When *A Pattern Language* appeared in 1977, *Architectural Design* declared that every library, school, environmental action group, architect, and first-year student should have a copy (Kohn, 2002).

Alexander’s “latest and most comprehensive and elaborate work,” *The Nature of Order: An Essay on the Art of Building and the Nature of the Universe*, includes Book One: The Phenomenon of Life, Book Two: The Process of Creating Life, Book Three: A Vision of a Living World, and Book Four: The Luminous Ground. In these four volumes, he proposed “a new theory about the nature of space” and described how this theory has influenced “thinking about architecture, building, planning [,] and the way in which we view the world in general” (Rothschild, 2009).

**What is a Pattern Language?**

Christopher Alexander and his associates developed the pattern language design method more than 30 years ago and described it in their book *A Pattern Language*. This design method can be applied by designers, architects, and users to create patterns or simple rules for designing livable and responsive environments (Pontikis, 2010; Rising, 1998). Alexander described that towns and buildings will not be successful or alive unless they are made by the people in the society to fulfill their common physical, emotional, and environmental needs.
As mentioned in the introduction of the book, *A Pattern Language* provides a practical method of developing a language for building and planning by describing a variety of detailed patterns. The book contains 253 highly structured patterns ranging from towns to buildings, interior spaces, and construction details that originated from observation and study of traditional architecture and urbanism. According to Alexander (1977), each pattern describes a recurring problem in our environment and then defines rules to resolve it. Different types of patterns are useful in many situations: design patterns, organizational patterns, management patterns, software design patterns, and so on in their respective fields. Patterns improve communication among designers, improve and simplify documentation, and improve future designs (Rising, 1998).

According to Alexander (1977), patterns do not exist in isolation. The 253 patterns are connected to each other to simplify understanding the language and represent the fundamental view of the world, which indicates that no one can merely build a thing in isolation but must restore the environment around it and within it. In *A Pattern Language*, all patterns are presented in the same format, which allows readers to easily understand each pattern, its problems, and solutions. (See example of pattern #41 [work community] on page 25.

All patterns are listed under three major scales: towns, buildings, and construction. The first scale contains 94 patterns that deal with the large-scale structure of the environment. In addition, they address many of the issues people face when living in modern towns and cities. This group of global patterns defines a town or community and helps lay out the overall arrangement of a group of buildings. The second group of patterns shapes the individuals, buildings, and the space between them. According to *A
Pattern Language, completing the first two groups of patterns provides a “rough scheme of spaces” and moves directly into the third group. The patterns in the third group present a physical attitude to construction that works together with the buildings’ patterns in the second group. Each pattern in the third group states a principle about structure and materials, which allows designers and architects to pay attention to the details of the build environment. According to Alexander (1977), patterns in the third group provide an alternative solution to the rigid and technocratic ways of the building environment in modern architecture.

Alexander’s approach to identifying and solving the fundamental problems that designers and architects face inspired professionals in other fields such as software engineering to use a similar approach for specifying, visualizing, constructing, and documenting artifacts of software-intensive systems (Jing, Sheng, & Kang, 2007).

Pattern Language Applications

Alexander and his colleagues are successful because they created an empirical approach to architecture by creating the pattern language theory. The pattern language theory inspired architects and designers of New Urbanism such as Dunay and Speck, who published The Smart Growth Manual. The book used Alexander’s concept of creating places and environments designed to fulfill people’s needs. The principles or patterns in the book are structured from large scales of regions to neighborhoods and to small scales of buildings and streets (Pontikis, 2010). Many architectural researchers such as Appleton believe that the goal of patterns is to create a body of literature to help resolve common difficult problems in our environments. According to Appleton, patterns have gradually become a shared language for communicating insight and experience about
environmental problems and their solutions (Chien, 1998).

Alexander’s ideas also influenced fields far beyond architecture and planning: poetry, organizational management, computer software design, and object-oriented programming applications such as Wikipedia and the Sims (Kohn, 2002; Pontikis, 2010). In the late 1980s, a few leading software engineers such as Herbert Simon started using Alexander’s definition of pattern (a three-part rule that expresses a relation between a certain context, a problem, and a solution) as a blueprint for analyzing computer routines and sharing successful design patterns as well as creating Unified Modeling Language (UML), modeling notations for specifying, visualizing, constructing, and documenting artifacts of software-intensive systems (Jing et al., 2007; Kohn, 2002).

**Current Pattern Language Structure**

In *A Pattern Language* (1977), each pattern describes environmental conflicts of space that occur over and over again in the living environment and then describes the solution to the problem. The book contains 253 patterns ranging from large scales such as regions and towns to smaller scales such as buildings and interior spaces—down to the smallest details of the construction work (Pontikis, 2010). All patterns in *A Pattern Language* are numbered in the order of their appearance, which gives each pattern a unique number.

Furthermore, the patterns are linked to each other and cross referenced to provide better understanding to the reader. In the case of the work community pattern, called “pattern #41” by the authors, other related patterns are scattered work (pattern #9), self-governing workshops and offices (pattern #80), men and women (pattern #27), and accessible green (pattern #60). While many patterns were identified by Alexander and his
colleagues, “there are many more that could be developed” (Christensen, 2004). Combining the patterns creates a “pattern language” or a network of patterns that can be used as a programming tool for communication among designer, client, and end users when creating a responsive environment.

The structure of each pattern in the book is as follows (Alexander et al., 1977, pp. x–xi; Pontikis, 2010):

1- A number and a title
2- An inspirational picture, which shows an archetypal example of the pattern
3- A list of bigger patterns in which the current pattern is rooted
4- Three diamonds to mark the beginning of the problem
5- A paragraph stating the problem
6- A discussion of the pattern’s critical issues
7- A diagram of the solution
8- A list of similar or smaller patterns needed to complete this pattern

See figure below for an example of the pattern structure from A Pattern Language book (page 25), pattern #41.
If you spend eight hours of your day at work, and eight hours at home, there is no reason why your workplace should be any less of a community than your home.

When someone tells you they like their job or the neighborhood, there is no reason why it shouldn’t be the same. The implication is straightforward. The people or culture believe they are not alone when they work. The implication suggests that what we are doing is just as important as what we are doing elsewhere. Anyone who saw the phrase “where do you live” in the everyday setting would not see the widespread cultural awareness of the fact that we are really “there” at our place of work—there is no way to escape there, no lure, no load—that he is not alone while working, not being, any more than being dead. As we understand this situation it leads us to another question: Why should we accept a world in which eight hours of our ‘lives’ are “dead”? Why should we not create a world in which our eight hours are just as much part of life, as much alive, as anything we do at home with our family and with our friends?

This project is discussed in other patterns—see Greater Work (4), and Work-Performing Neighborhood (5). Here we will discuss work communities.

41 Work Community

- If the work patterns are grouped around a common country, where people can sit, play volley ball, eat lunch, it will help the community and neighborhood among the workers.
- The work community is the larger community in which it is located.
- A work community is formed from the central community (4) and new core workers (5). In addition, each work community and neighborhood community can grow by sharing facilities and equipment—common areas, offices, libraries. There is a need for the work community to open up to the larger community with shops and cafes at the store between them.
- Finally, it is necessary that the common land, or common, area be at the district and peripheral level. On the one hand, the country and common country and certain communities can grow by sharing facilities. On the other hand, the land and facilities need more like 20 or 30 group works to survive. For this same the work community needs one kind of clustering.

Therefore:

Build or encourage the formation of work communities—such as a collection of smaller clusters of workplaces which have their own countries, gathered around larger common squares or country squares which contain shops and lunch counters. The total work community should have more than 20 or 30 workplaces in it.

Figure 2.1. Pattern Structure Example

Copyright Alexander et al., 1977.
According to Alexander (1977), patterns can also be written in simplified forms, as they consist of four essential elements. The first element is the pattern’s number and name, used for identification, followed by the second element, a description of the problem. In *A Pattern Language*, an inspirational photo is presented in each pattern to help readers understand the solution. The third element is the solution statement, which includes the elements that make up the design, their relationship, and collaboration. The fourth element is the conclusion to show the importance of applying the pattern in further designs and environments.

In the example of pattern #183, a workspace enclosure (on pages 846–852), the problem is defined as not having a balance in the workplace, as it is either too enclosed or too exposed, neither of which scenario will allow workers to work effectively. The solution to the problem is presented in sets of nine successful rules such as having a wall to one side of the work area, enclosing each workspace 50–75% by walls or windows, leaving the front of the workspace open for at least eight feet, etc.

**Humane and Green Patterns**

A distinction exists between humane and green patterns. *Humane* patterns describe problems with the qualitative aspect of space such as space design geometry, function, openness, furniture quality, and color selection. Each humane pattern relates to human feelings and sensibilities. The aim of the humane patterns is to create livable environments that respond to people’s physical, emotional, spiritual, and cultural needs (Pontikis, 2010). On the other hand, *technical* or *green* patterns describe problems with the quantitative aspects of space such as building technology, construction, and materials. The aim of the green patterns is to protect and preserve the environment (Pontikis, 2010).
When *A Pattern Language* was developed, no particular attention was paid to green patterns. However, some of the patterns are sustainable such as pattern #104 (site repair), which indicates that a building must always be built in those parts of the land in the worst conditions. Pattern #207 (good materials) proposes the use of ecological materials low in energy consumption.

This study will focus on certain humane patterns—space layout, natural light and views, and personalized work environment—as well as certain green patterns: material recycling and reuse, artificial lighting, and air quality.

**Humane Work Patterns**

According to Rafaeli, Vilnai-Yavetz and Yaacov’s framework on office work design, office design should be considered along three concurrent and independent dimensions: *instrumentality, aesthetics, and symbolism* (Elsban & Bechky, 2007; Vilnai-Yavetz, Rafaeli, & Yaacov, 2005). The instrumental, aesthetic, and symbolic dimensions deal with the qualitative and humane aspects of an office space. The humane patterns studied for developing the workspace pattern language in this thesis are listed from the three dimensions of office design.

**Space Layout**

- Geometry of space
- Office space functionality
- Connectivity and accessibility

**Lighting**

- Access to natural lighting
- Windows and natural views
Personalized Workspace

- Freedom to add and personalize
- Furniture selection and modification

Space Layout

Office space layout consists of three main aspects: space geometry, its function, and connectivity and accessibility. The physical geometry of the office space and its function can improve the performance and satisfaction of office workers (Elsban & Bechky, 2007; Vilnai-Yavetz et al., 2005).

Geometry of Space

In *A Pattern Language*, the following patterns are associated with the geometry of space (listed in order of appearance in the book): #61 (small public squares), #82 (office connections), #106 (positive outdoor space), #111 (half-hidden garden), #121 (path shape), #191 (the shape of indoor space), #205 (structure follows social spaces), #210 (floor and ceiling layout), and #212 (columns at the corners).

Pattern #191 (the shape of indoor space) is an example of a humane pattern that defines the geometry of the space. According to the authors of *A Pattern Language*, in current modern architecture, buildings are crystalline squares and rectangular in shape, which represents the rigid desires and fantasies of designers as they are occupied with the design process instead of fulfilling occupant needs (p. 883).

In every space, walls that are part of social spaces must be straight, unless the walls are thick enough to be curved on both sides. The wall may be curved whenever there is no significant social space on the outside of it. For example, if the entrance of a building is facing a street, the outside area can be curved (p. 885). The corners of spaces
must always have simple angles between 80 and 180 degrees. The majority of spaces in a building must be polygons, with roughly straight walls and obtuse angled corners. At the same time, designers must take into consideration the ceiling design and relate it to the shape of a spherical bubble similar to the human axis (p. 887).

According to Alexander (2002), good geometry increases the quality of life and the comfort of the users of the space, as it can be achieved through the generative design process. The generative design process was defined by Christopher Alexander as a step-by-step process that specifies how to make a building or space design unfold beautifully (2002). The step-by-step process must maintain built-in feedback to check that each step is increasing the quality of life and comfort of people utilizing the space. Furthermore, the generative design process is supported by Alexander’s “structure preserving and transformation” concept. Crucial aspects of this concept are attention to space, space adjustments, and understanding space beauty and wholeness—as well as preservation and enhancing of its wholeness during the step-by-step transformation (Alexander, 2002). Therefore, good space geometry is the coherent geometry that makes the space a unity or a whole through its entire process, followed by feedback to modify the overall design if needed (Alexander, 2002).

Office Space Functionality

The pattern #146 (flexible office space, pages 690–695) is an example of a humane pattern that explains the functionality of an office design. Every work organization undergoes a series of change. In an office, the clusters of work groups, their sizes, and their functions are all subject to change—often unpredictably. Designers usually solve the problem of flexibility in an office space by creating either an open space
An open office space is a shared room with workstations often freely arranged in groups, and there is no access to individual windows (Danielsson & Bodin, 2008). An open office space is a shared room with workstations often freely arranged in groups, and there is no access to individual windows (Danielsson & Bodin, 2008).

According to Alexander (1977), an open office space design is an uninterrupted modular space with modular full-height or half-height partitions.

In general, open office designs exert a positive effect on improving information flow and increasing task feedback, and it allows employees the chance to observe and learn from what is happening in the workplace (Carnevale, 1992; Elsbach & Bechky, 2007). Despite the fact that an open office design may be useful, however, Alexander (1977) pointed out the difficulties of working in such an open space. If the partitions are designed to be easily moved, they must be lightweight and thus will not provide acoustic isolation. Partitions that are both easy to move and acoustically insulated are usually expensive. Moving partitions in an open space design is also highly costly. Finally, it is in the nature of office space that certain informal, semi-permanent arrangements, such as filing systems, grow more permanent over time.

Office landscape space is an entire floor of an uninterrupted space with a low ceiling and no partitions (Alexander et al., 1977, p. 690). An office landscape is suitable only for types of work that do not require a high degree of privacy.

The authors of A Pattern Language recommended creating an office space with wings of open spaces and freestanding columns around their edges to define half-private
and common spaces opening into one another. In such an office layout, natural light is critical (Alexander et al., 1977, pp. 690–694). See figure below for flexible office space.

Figure 2.2. Flexible Office Space

![Figure 2.2. Flexible Office Space](image)

*Figure 2.2. Copyright Alexander et al., 1977.*

**Connectivity and Accessibility**

Workspace layout generates spatial boundaries that divide and reunite the office space. These boundaries create relations of accessibility and visibility that integrate or segregate behaviors, activities, and people. In every workspace there are patterns of circulation and accessibility among the departments and offices. The connectivity and accessibility among the departments are important interrelationships that become fundamental to the development of the users and the organization (Wineman, Kabo, & Davis, 2012).

Good connectivity and accessibility among departments in the office space can be measured by the basis of the ways that spaces relate to other spaces in the larger office space rather than the metric distance among them. For example, a workshop room may be 10 meters away from the conference room but has a direct connection to the project room.
(Peponis et al., 2007; Wineman et al., 2012). According to the generative design process addressed by Alexander and his colleagues, having a clear main and shared center will define the connectivity among other spaces (2002).

The case study on relocation of ThoughtForm published by Peponis and his colleagues (2007) showed the importance of connecting different spaces to one another and how a main space can help define connectivity among spaces. The old layout of ThoughtForm was divided into several distinct spaces with unsatisfactory connections. However, the new layout was designed around a main shared space and a longitudinal circulation path that connected the spaces together.

Any office space provides two kinds of interactions: planned and unplanned. Planned interactions are usually associated with formal, scheduled meetings in conference rooms or private individual offices. On the other hand, unplanned interactions can occur everywhere and can arise as a byproduct of movements in and around work areas (Peponis et al., 2007). In the case of the relocation of ThoughtForm, there was a significant increase of unplanned communications, which allowed for more flow of information among departments.

Relating and connecting spaces to one another in the work environment is key in improving employee interactions such as work-process interactions, social interactions, interactions linked to seeking expert advice, interactions linked to innovation, and interactions linked to decision making (Peponis et al., 2007; Wineman et al., 2012). According to Davis (2012), clear accessibility to different spaces in the work environment will increase employees’ positive attitudes and overall productivity by providing equal opportunity access to team workspaces, informal spaces, and the presence of natural light.
Lighting

Lighting is a humane pattern consisting of factors that affect the sensory experience of the employees, such as having a sense of confusion or a sense of belonging to the space (Elbsbach & Bechky, 2007; Yavetz et al., 2005). The lighting pattern possesses the following subcategories: access to natural light—and windows and their connection to outside views.

Access to Natural Light

Incorporating natural daylight into any building environment promotes many physiological and psychological benefits including increasing user satisfaction, decreasing stress, and lowering energy costs (Boyce et al., 2003). The authors of A Pattern Language (1977) understood the importance of incorporating daylight in building design. Pattern #128 (indoor sunlight) indicates that the rooms or places that are most used must have proper indoor sunlight and must be placed along the south edge of the building. Also, pattern #159 (light in two sides of every room) indicates that people gravitate to the spaces with windows looking outside and allowing natural light to come from two sides more than to the spaces with natural light coming from one window.

The physiological and psychological benefits of incorporating natural daylight into a building may not be achieved by simply introducing daylight into a building without considering occupants’ responses and reaction to a daylight environment such as mood, preferences, and cognition performance (Wang & Boubekri, 2011). Occupants’ preferences indicate individuals’ choices or plans for using the space, while cognitive performance reflects the real influence of an environment. Cognitive performance may or may not be in line with individual preference. In office design, users may be aware of
their preferences more than of their cognitive performances and thus adjust their behavior and mood based on their understanding of and preferences for daylight conditions. Therefore, it is important to take into consideration users’ preferences for certain daylight conditions.

Wang and Boubekri (2011) designed an experiment to measure room occupants’ moods, preferences, and task performance in a sunlit room. The experiment was conducted in a 20-foot-by-16-foot multifunctional seminar room. The experimental room offered a floor-to-ceiling window with an outdoor view of natural landscape. The researchers examined 10 different seating locations. The 10 spots possessed different levels of exposure to the sunlight and access to the outdoor view. Under this arrangement, occupants also experienced different levels of privacy and control. For example, subjects sitting in the corner enjoyed a higher level of privacy than did those sitting in the middle of the room. The subjects were given reading and analog tasks. Wang and Boubekri found that subjects’ performance was not affected by their position to the sunlight or the window view due to the presence of control and privacy. For example, the occupant who was sitting in the back corner of the room produced better results than did occupants sitting closer to the window.

Occupants’ performance in a workplace can be improved in a sunlit environment with a sense of control and privacy. Access to natural light in the work environment is as desirable as personal control over the lighting in the office space. In the work spaces, lighting systems that use both direct and indirect lighting are preferred over direct-only systems. Also, workers with access to window blinds to control the amount of sunlight are more satisfied with the work environment (Veitch, Stokkermans, & Newsham, 2011).
Many people spend most of their time indoors. When spending time indoors, they may lack access to some potentially beneficial features of the outdoor environment such as natural scenery. Windows can offset their deprivation by providing views to the outdoors; however, some people have little or no access to windows in the setting where they spend most of their waking hours, the workplace (Bringslimark, Hartig, & Patil, 2011). Individuals consistently indicate preference for interior offices that have windows, natural views, and daylight. Also, better comfort ratings are generally received from office building occupants with access to windows than from those seated away from windows (Wang & Boubekri, 2011).

In a study on daylight, access to natural views, and productivity, older individuals preferred access to a window more than did others. People in windowed offices spent 15% more time on work-related tasks than did people working in interior offices away from windows. Lack of access to windows is associated with less control at work, job dissatisfaction, feelings of isolation, and job stress.

Workers without access to a window view try to compensate for the lack of view by bringing in plants and pictures of nature. Workers who do not sit close to a window roughly demonstrated five times greater odds of having brought plants and over three times greater odds of having brought pictures of nature into their workspaces than did workers with a window view (Boyce et al., 2003; Bringslimark et al., 2011). According to Alexander and his colleagues (1977), windows not only are a source of natural light but also provide views of the outside world. Outside and natural views are restful to the eyes, allowing them to change focus. They also provide connection with nature and relieve
feelings of being trapped.

**Personalized Workspace**

Personalization of the workspace is a humane pattern that represents individual identities and ability to add, adjust, and modify some current entities of the space such as furniture or paint colors (Elsbach & Bechky, 2007; Wells, Thelen, & Rurak, 2007).

*Freedom to Add and Personalize*

In *A Pattern Language* (1977), pattern #253 (things from your life) is an example of a humane pattern that defines the importance of people’s adding personal touches such as family pictures or collections to their spaces. In this pattern, Alexander pointed out that individuals surround themselves with personal items that mean the most to them and offer the power to play a part in their continuous process of self-improvement and motivation.

Personalization offers many psychological benefits for employees. It expresses one’s personality and uniqueness. Office personalization is more important to signaling an occupant’s personal distinctiveness and identity (i.e., how a person is qualitatively different from others) than his or her personal status (i.e., how a person is ranked in comparison to others). Therefore, workers are willing to give up more practical privacy features in their office space such as closeable doors for personalized territorial items such as plants. As a consequence, individuals who lose the ability to personalize their office space due to a company’s policies limiting personalization feel that their individual distinctiveness is more threatened than their status (Davis, 1984; Elsbach & Bechky, 2007; Wells, 2000). Some companies’ policies limit the amount, the location, or the content of personalization. However, when companies do have such policies, employees tend to personalize their workspaces anyway to create their work identity (Elsbach &
In the United States, approximately 70–90% of American workers personalize their workspaces (Wells et al., 2007).

Work personalization can help employees cope with stress and express emotions. The act of personalization helps new employees adapt to their new work environments and enhances their emotional attachments to their workplaces (Wells et al., 2007). Therefore, work personalization can enhance job satisfaction and employees’ well being. Personalization is also related to creativity: Teams that collectively personalize their spaces with items reflecting the team’s goals and achievements appear to be more creative than are teams that do not personalize in this way. Allowing employees to personalize their workspaces also offers benefits for companies including higher levels of employee morale, enhanced organizational and social climates, and reduced turnover (Wells, 2000).

Furniture Selection and Modification—Office Chair

Pattern #251 (different chairs) is an example of a humane pattern that discusses the quality and arrangement of chairs. Pattern #251 explains a tendency in modern times to make all chairs alike despite the fact that people are different sizes and sit in different ways. According to the authors of A Pattern Language, the tendency to make all chairs alike is fueled by the demands of prefabrication and economy. Chairs are designed to be cheaply manufactured in mass quantities (Alexander et al., 1977, p. 1158).

The Control and Prevention (CDC, 2000) suggests that standard office furniture is generally unsuitable because it cannot accommodate everyone’s needs. For example, new employees are typically assigned the desk and chair used by the previous occupant with little or no consideration of the individual’s size or physical characteristics. According to
authors of *A Pattern Language* (1977), some people are chronically uncomfortable when using the standard office chairs as they do not fit their sizes (Alexander et al., 1977, pp. 1158–1159). At the same time, the CDC (2000) explains that an office chair must be well designed and appropriately adjusted as an essential element of a safe and productive workstation. A good office chair design provides necessary support to the back, legs, buttocks, and arms while reducing exposure to awkward postures, contact stress, and forceful exertions.

Chair comfort in particular is important in any office configuration; 73% of office workers reported that it influenced their personal comfort a great deal. Chair comfort can be increased by adjustability. The ability to adjust furniture to suit individual differences in work styles might increase environmental satisfaction and job satisfaction. Furniture adjustments also allow individuals to adapt to specific task demands. Allowing employees to adjust furniture to suit their physical characteristics helps employees exert control over their office environment (Wells, 2000).

**Green Work Patterns**

In an effort to reduce consumption of energy, water, and material resources, designers need to use green building systems, materials, and products in their structures. Also, they need to employ sustainable procedures and waste management and recycling practices. If the client wants to pursue third-party green building certification, the designer needs to be familiar with the green building rating system chosen. BREEAM, Green Globes, LEED, Build it Green, and Green Building Challenge (GBC) are just a few of the green building rating systems. Some clients do not want to go through third-party verification yet want their buildings to be green (Pontikis, 2010). Therefore, designers
need to be knowledgeable and experienced in the following green building categories: site planning and design, water conservation, energy conservation, material conservation and reuse, and indoor environmental quality.

**Site Planning and Design**

According to the Whole Building Design Guide Sustainable Committee (WBDG, 2012), the location of a building can exercise either a positive or a negative impact on the environment as well as on occupants’ security, accessibility, and energy consumption for transportation. Therefore, the development of new sustainable buildings starts with proper sites. Proper sites can be determined by site location, site selection, site design, and landscape design. These processes include the use of Brownfield and existing infrastructure as well as the provision of sufficient public access (http://www.wbdg.org/design/site_potential.php).

**Indoor Environmental Quality**

In an effort to build cost-effective buildings, it is easy to forget that the success or failure of a project depends on the well-being of its occupants. Healthy and comfortable employees are more satisfied and productive. Unfortunately, nowadays, designers tend to focus more on the cost of a project than on determining the value of increased user productivity and health (WBDG, 2012).

The indoor environmental quality of a space consists of different health, safety, and physical comfort elements such as considering airborne contaminants (allergens, mold, and VOCs), visual stimulation, lighting, and space flow. Designers should focus on providing high-quality interior environments for all users by using healthy materials, reducing moisture, installing efficient HVAC systems, and directing natural lighting and
ventilation (http://www.wbdg.org/design/ieq.php).

**Water Conservation**

According to the WBDG Sustainable Committee (2012), one main issue of water consumption is that the demands on the supplying aquifer surpass its ability to replenish itself. Developers and designers should decrease buildings’ need for potable water by increasing efficiency and maximizing the use of water that is collected, used, purified, and reused on site. Water efficiency in buildings conserves freshwater resources. Savings can be achieved by installing water-efficient plumbing fixtures and appliances. Also, one can utilize exterior water efficiency by using low-water landscape methods. Water conservation must be a key consideration throughout the life of the building and in the reuse and renovation of an existing building (http://www.wbdg.org/design/conserve_water.php).

**Energy Conservation**

According to the Annual Energy Review Report (2012), on an annual basis, buildings in the United States consume around 40% of America’s energy and around 68% of its electricity. Currently, the vast majority of this energy is produced from non-renewable, fossil fuel resources. The use of energy from fossil fuels poses many negative environmental impacts from mining to transporting and burning them (http://www.wbdg.org/design/minimize_consumption.php).

It is essential to find ways to reduce energy use, increase efficiency, and utilize renewable fuel resources such as using energy-saving lighting, fixtures, and appliances in facilities of all types.
Energy-Saving Equipment and Appliances

New technologies have opened the door to more advanced products that can increase energy supply and energy efficiency in commercial facilities. Energy resources are becoming limited, and this makes the creation of energy-efficient equipment and appliances such as computers, copiers, microwaves, and refrigerators even more essential to organizations (Kopec, 2009, pp. 150, 177). In office buildings, office equipment and appliances such as computers and refrigerators are the largest contributors to electrical loads. Fortunately, their impact can be reduced by the use of Energy Star-rated products through power management features.

Pieces of equipment with power management features when not in use automatically enters a low-power “sleep” mode (Bonda & Sosnowchik, 2007, pp. 94–95).

According to the United States Environmental Protection Agency (EPA, 2009), an Energy Star-qualified computer consumes 30–65% less energy depending on how it is used. In 2012, the EPA reported that the Energy Star-qualified refrigerators can save up to $700 over their lifetime.

Artificial Lighting Control:

In commercial buildings, lighting is estimated to account for 40% of the electricity used (Winchip, 2007). Today, lighting controls are used as a lighting management tool to provide a comfortable environment for the occupants and save the maximum amount of energy and money (Bonda & Sosnowchik, 2007, pp. 84–85). Time devices, dimming devices, and occupancy and daylight sensors are the most common controls used in commercial office designs. Occupancy sensors automatically turn lights on when the space is occupied and off when the space is vacant. Occupancy sensors are sensitive; they
can detect any movement, and this places them in high demand for spaces such as offices and restrooms. On the other hand, dimming controls can provide the lighting flexibility often required in multi-use rooms such as conference rooms.

**Material Conservation and Reuse**

The composition of materials used in a building can exercise either a positive or a negative lifecycle environmental impact. The efficient use of eco-friendly materials conserves natural resources. It also reduces waste and decreases the environmental impact of raw materials through extraction, processing, transportation, installation, maintenance, and reuse. Environmentally friendly materials produce a reduced effect on human health and contribute to improved worker health and safety (Bonda & Sosnowchik, 2007, pp. 50–51).

*Material Reuse and Recycle:*

While manufacturing new products consumes limited natural resources and disposing of unwanted materials pollutes the environment, poor communities face difficulties accessing affordable goods they need. Office furniture and supplies not in use can be donated to schools, children’s hospitals, and other non-profit organizations. Reusing materials is one of the most preferable waste management strategies, as it calls for the reuse of items by repairing, donating, or selling them (Bonda & Sosnowchik, 2007, p. 50; Pontikis, 2010).

For example, the floor covering industry received aggressive criticism for many negative environmental impacts in the areas of materials usage and disposal (Bonda & Sosnowchik, 2007, pp. 121–122). In 2012, the EPA reported that the manufacturing process of carpet and the materials used in it often creates negative handling, collection,
and recycling problems. Most carpet is made to last, but once it grows dirty or falls out of style; it is often thrown away well before the end of its useful life. The Carpet America Recovery Effort (CARE) made efforts to increase the amount of reuse of postconsumer carpet and reduce the amount of landfill waste (http://www.epa.gov/wastes/conserve/tools/stewardship/products/carpet.htm).

Material recycling is a strategy that turns materials that would otherwise become waste into valuable resources such as recycled furniture or upholstery (Pontikis, 2010). Business owners need to buy products with recycled content in order for the recycling strategy to continue to work successfully. The office furniture industry produces negative environmental impacts, depleting natural resources. Many companies throw away their desks, chairs, and filing cabinets to make room for newer and trendier options in the market. Therefore, designers and business owners need to be aware of green office furniture options such as Haworth’s Zody, a task chair made with up to 51% recycled content and up to 89% recyclable materials (Bonda & Sosnowchik, 2007, p. 136).
CHAPTER III

METHODOLOGY

The thesis project is divided into the following major parts:

1. Statement of the Problem
2. General Description
3. Site Analysis, Interviews, and Surveys
4. Humane and Green Design Guideline
5. Related Patterns and Simplified Format
6. Design Development
7. Post Design Evaluation

Each of the above parts will be explained below in more detail.

Statement of the Problem

The design study focused on understanding the changes in the work environment and their impact on employee needs and productivity. The design study included the review of a variety of books, journals, previous studies, and statistics to better understand the current work environment and its challenges in the 21st century.

The primary goal for this design study was to integrate humane and green patterns in an easy and eligible manner to create a constructive design framework for office spaces. Such a framework will help design professionals work with business owners and employees to create office environments with humane and sustainable qualities (see Chapter 2). For reaching this goal, Sonic Electronix, a retail store in Valencia, California, was selected.
General Description

Sonic Electronix’s store is located at 28340 Ave Crocker, Suite 202, in Valencia, California. The entire building’s height is 25 feet (see Figure 3.1).

Figure 3.1. Site Plan of Sonic Electronix

Figure 3.1. Copyright 2013 by Dalia Hazboun.

The building is divided into two main floors. The first floor includes the pick-up area (see Figure 3.2) and the marketing department, which consists of 15 employees (see Figure 3.3). The marketing department has a small kitchen (see Figure 3.4), employee cubicles (see Figure 3.5), a conference room (see Figure 3.6), and an executive office. The second floor includes the call center department, which consists of 30 employees (see Figure 3.6).
Figure 3.2. Customer Pick-up Area

Figure 3.2. Copyright 2013 by Sonic Electronix.

Figure 3.3. Marketing Department Space Feel

Figure 3.3. Copyright 2013 by Sonic Electronix.
Figure 3.4. Marketing Department’s Kitchen  Figure 3.5. Employee’s Cubicle

Figure 3.4. Copyright 2013 by Sonic Electronix.  Figure 3.5. Copyright 2013 by Sonic Electronix.

Figure 3.6. Conference Room

Figure 3.6. Copyright 2013 by Sonic Electronix.
Site Analysis, Interviews, and Surveys

The site analysis started with multiple visits to Sonic Electronix. The visits involved evaluating different areas in the building such as the marketing department, pick-up area, call center, break rooms, and conference room and observing the way that working personnel utilize the spaces. Evaluating different areas with the managers of Sonic Electronix helped identify the areas with the least humane and least sustainable characteristics. Observing what works and what does not work in various areas created a better understanding of employee needs and the impact of the workspace on achieving higher work efficiency and better interaction among employees.

In order to create a humane and green design framework responsive to employee needs and reflecting the culture of Sonic Electronix, informal interviews were held with the owner and three of the head managers. Surveys also were conducted with the employees. During the first visit to Sonic Electronix, an unstructured interview was
conducted with the following open-ended questions asked of the owner:

1- What is the culture of the organization?
2- What do you think of the current physical work environment?
3- Do you think that the current workspaces reflect the organization’s culture? Why?
4- What problems do you see in your current workspace?
5- Are you satisfied with your employees’ productivity?
6- What sustainable practices do you support within your organization?
7- Are you interested in learning about sustainability and how it can improve profitability?
8- Are you open to understanding employees’ needs and listening to their feedback?

After the interview with the owner, an unstructured group interview was held with three of the head managers. The following are some of the questions asked during the interview:

1- What do you think of the work physical environment?
2- Is it comfortable to work in the current environment?
3- Which areas in the work environment would you recommend to improve? Why?
4- Do you think that there is efficient lighting in the office spaces?
5- Do you allow employees to personalize their work area?
6- Do you have an area that reflects employee and business achievements?
7- Do you have any say in your furniture selections?
8- What sustainable practices does your organization support?
9- Are you open to hearing employee feedback?
10- How would you describe the following features in your environment: layout,
décor, lighting, furniture, and materials?

Lastly, survey questions were given to 45 employees, 30 from the call center department and 15 from the marketing department. The survey provided an area to write the department name in order to evaluate the needs of each department. The survey was divided into the following sections: work modes (collaborate, focus, learn, and socialize), office layout, lighting, furniture, personalization, and sustainability. Each section asked fixed questions and gave an area to write freely any comments or concerns regarding the sections. The following are some of the questions from the survey:

1- In percentage, rate the importance of the work modes (collaborate, focus, learn, and socialize) to your job performance.

2- Where do you perform each work mode—primary workspace, conference room, training area, break/common rooms?

3- Are you satisfied with the amount of space available to perform your daily tasks?

4- Do you have easy access to break rooms?

5- Are you allowed to personalize your work area, such as adding plants or family pictures?

6- Describe any other concerns related to the lighting of the workspace.

7- Would you be prouder if your company were more sustainable?

All employees from the marketing department participated in the survey; however, only 20 employees participated from the call center department. In general, employees showed highest importance percentages for the collaboration work mode. In particular, employees mentioned that the break room is not functional and the conference room is limited in space. Also, most employees indicated that they would be prouder if
the company exercised more sustainable practices (see Chapter 4). Eventually, based on the site observations, interviews, and surveys, a draft checklist was prepared to help identify and integrate the humane and green design principles to be utilized in setting the pattern language.

**Humane and Green Design Guideline Assessment**

The guideline is divided into two major parts: humane design and green design. Each part is divided into categories and subcategories. This guideline was prepared to help identify the humane and green principles to be utilized in setting the pattern language. Also, the guideline was used as a fundamental tool to help incorporate the humane and green principles and apply them to improve the work environment.

**Humane Design**

**A- Space Layout**

1. Geometry of Space
   - Are spaces designed to support and enhance one another through a step-by-step process involving occupant feedback?
   - Is there a variety of office furniture to support its geometry?

2. Space Functionality
   - Do spaces support needed functions, work modes, and activities?
   - Do spaces have the right balance between openness and privacy?

3. Connectivity and Accessibility
   - Is there clear circulation among spaces related to one another?
- Are social and functional spaces such as break rooms and the conference room easily accessible?

**B- Lighting**

1. Access to Natural Light
   - Is there access to natural light?
   - Is there enough natural light in the space?

2. Natural Views
   - Are the inside spaces connected to outdoor spaces and natural views?

**C- Space Personalization**

1. Freedom to Personalize
   - Do spaces allow people to personalize and adjust them to their needs?

2. Furniture Selection
   - Is there comfortable and ergonomic furniture?
   - Can furniture be modified and adjusted to support individual needs?

**Green Design**

**A- Indoor Environmental Quality (IEQ)**

1. Minimize the Use of Toxic Material
   - Do the materials used within the space emit low VOCs?

**B- Energy Conservation**

1. Energy-Saving Equipment and Appliances
2. Artificial Lighting Control

C - Material Conservation

1. Material Reuse and Recycling

Related Patterns and Simplified Format

The office environment’s pattern language was formed based on Alexander’s pattern language theory. According to Alexander (1977), each pattern represents a problem that occurs over and over again in the living environment. A suggested solution is described for the problem (see Chapter 2). The first step to create patterns for this project was finding related patterns for the work environment and its users from the pattern language book.

The following patterns were identified as related to the project (listed in order of appearance in the book): #9 (scattered work), #41 (work community), #82 (office connections), #107 (wigs of light), #110 (main entrance), #120 (path and goals), #131 (the flow through rooms), #132 (short passage), #142 (sequence of sitting spaces), #146 (flexible office space), #148 (small work groups), #151 (small meeting rooms), #152 (half private office), #163 (outdoor room), #183 (workspace enclosure), #191 (the shape of indoor space), #194 (interior windows), #207 (good materials), #233 (floor surface), #237 (solid doors with glass), #241 (seat spots), #250 (warm colors), #251 (different chair), #252 (pools of light), and #253 (things from your life). The above patterns served as an inspiration for the project.

The next step was simplifying the format of Alexander’s patterns to better reflect the current work environment and serve as an easy eligible tool for creating patterns in future projects. The following explains the simplified format:
For each pattern, a distinguished number and title were defined to represent the pattern in the best way. Then, an inspiration photo was selected to show an example of the pattern. The next step involved a description of the problem that might occur over and over in the work environment and in the selected office space. For each problem, a practical design solution was proposed based on the gathered literature. After the solution was a rendered sketch or floor plan of the proposed design showing the application of the solution in the selected office space.

Listed below are the simplified instructions for writing patterns:

1. Number and Title of the Pattern
2. Description of the Pattern
3. Inspirational Image
4. Problem Description
5. Proposed Solution
6. Solution’s Application Sketch or Floor Plan
Design Development

Using the humane and green design guideline and the inspiration from the related patterns in *A Pattern Language*, the following tables show the patterns under each design guideline (see Table 3.1 for human patterns and Table 3.2 for green patterns).

| A. Space Layout | 1A. Geometry of space | 1A.1. Spaces’ Boundaries  
1A.2. Sequence of spaces  
1A.3. Spaces within spaces |
|-----------------|-----------------------|------------------------------------------------------------------|
|                 | 2A. Space Functionality | 2A.1. Visible Space Identity  
2A.2. Degree of Privacy  
2A.3. Flexible Spaces |
|                 | 3A. Connectivity and Accessibility | 3A.1. Space Entrance  
3A.2. Office Connections  
3A.3. Easily Accessible Spaces |
| B. Lighting     | 1B. Access to Natural Light | 1B.1. Glass partitions  
1B.2. Lighting Variety |
|                 | 2B. Natural Views | 2B.1. Indoors Natural Elements  
2B.2. Outdoor Break Area |
| C. Personalization | 1C. Freedom to Personalize | 1C.1. Space Personalization  
1C.2. Shared Inspirational Spaces |
|                 | 2C. Furniture Selection | 2C.1 Choose your Office Chair  
2C.2. Ergonomic Furniture |

Table 3.1. Humane Patterns for the Office Environment

<table>
<thead>
<tr>
<th>A. Indoor Environmental Quality</th>
<th>1A. Minimize Noise</th>
<th>1A.1. Soundproofing Partitions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2A. Movement and Flow</td>
<td>1A.2. Individual Privacy</td>
</tr>
</tbody>
</table>
1B.2. Break Room Appliances |
|                                 | 2B. Artificial Lighting Control | 2B.1. Lighting Sensors  
2B.2. LED Lights |
| C. Material Conservation       | 1C. Material Reuse and Recycling | 1C.1. Green Materials  
1C.2. Recycling Waste |

Table 3.2. Green Patterns for the Office Environment
Integrating Humane and Green Patterns into One Language

In an effort to integrate humane and green patterns into one language, the researcher reviewed the above patterns, the book *A Pattern Language*, the interview results from the owner and head managers, as well as the results from the employee surveys.

According to the owner, Sonic Electronix strives to become the first online shopping destination focusing mainly on car electronics and other consumer electronics. The culture of Sonic Electronix is casual, and the company seeks to always increase collaboration and teamwork. The owner mentioned that despite the fact that there is a need for teamwork, some specialists need to focus on individual projects and tasks. The owner believes that some parts of his company reflect the culture of the organization, such as the pick-up area and the call center; however, the marketing department lacks organization. The head managers of Sonic Electronix see the importance of listening to employee feedback and allowing personalization in the workspaces. Also, the head managers believe that the layout of the office space in the marketing department does not support teamwork.

The employees noted that the work environment is dull and lacks daylight and organization. They also noted that the break rooms and conference room are limited in space and need durable flooring. Lastly, the employees noted a concern regarding the uncomfortable office furniture and chairs in the break rooms.

After reviewing the humane and green patterns (see Table 3.1 and Table 3.2), understanding employee needs, and respecting the culture of the organization (see Chapter IV), the researcher found overlapping categories of humane and green aspects.
All of the humane categories—Space Layout, Lighting, and Personalization—have sub-categories with humane and green aspects because humane categories are responsive to user needs and enhance the environmental quality of the space. Under each humane and green aspect, we listed the patterns that best reflect the category.

The Indoor Environmental Quality is the only green category with humane and green aspects (see Table 3.3). The Artificial Lighting Control, a sub-category under Energy Conservation, was placed under the green aspect of the Lighting category. We found out that artificial lighting cannot be separated from natural light design and that combining them under one category will create a stronger design category for future projects.

On the other hand, we noticed that the Energy Conservation and the Material Conservation categories deal mainly with the technical aspect of design. However, some material selections can be responsive to employee needs such as selecting more-durable flooring. In this case, this pattern can have some humane aspect as it is responsive to user needs.

**Post Design Evaluation**

**Evaluation by Experts in the Field**

Once the pattern language was developed, two experts in the field of pattern language were selected by the major advisor to evaluate the pattern language, its humane and green patterns, and the new structure of pattern. The experts had one week to reply via email. For confidentiality, the experts were randomly numbered and referred to as “expert reviewers.”
Experts’ Characteristics

Expert Reviewer #1 is a noted architect. She is a founder of a notable architecture firm in Seattle. She studied and worked with Christopher Alexander for several years. She has been using pattern language theory in many of her projects and designs.

Expert Reviewer #2 is a strategic development consultant with expertise in pattern languages and their application and the executive director of the Portland, Oregon-based Sustasis Foundation. He is also a visiting professor and a researcher at five graduate schools in four countries and an editorial board member of three international journals in Urbanism. He is also a contributing author to 16 books on sustainable urban development and a regular author for the Urban Land Institute, Metropolis, The Atlantic Cities, and other professional planning publications.

Experts’ Evaluation Measurement

The questions given to the experts were both close ended and open ended. For the close-ended questions, the response choices were rated from 1= extremely difficult to 10= extremely easy. Some open-ended questions were used to explain the matter more in depth and to receive constructive feedback. The developed pattern language, introduction letter, and questionnaire were emailed to the experts.

Introductory Letter to the Design Experts

The purpose of this letter and questionnaire is to obtain an expert opinion regarding the subject matter of part of a Family and Consumer Sciences Interior Design graduate master’s project. In particular, the topic is using the pattern language as a method to create humane and sustainable office environments for employees.

Please take the time to review the pattern language and following questionnaire
Thank you in advance for your help, cooperation, and expert opinion.

Questionnaire

Instructions: Please answer the following questions.

Please explain your answers.

Send your replies to Dalia Hazboun via email:

devida2@hotmail.com

Thank you for your replies.

1. Do you find the structure of the integrated humane and green pattern language easy to follow? Please rate from 1 to 10, with 1 being “extremely difficult to follow” and 10 being “extremely easy to follow.”

2. Is the pattern language easy to understand? Please rate from 1 to 10, with 1 being “extremely difficult to understand” and 10 being “extremely easy to understand.”

3. Would you make any changes to the following simplified pattern language structure? Please note which ones and why.

   a) Number and Title of the Pattern
   b) Inspirational Image
   c) Problem Description
   d) Proposed Solution
   e) Solution’s Application Sketch or Floor Plan

4. Do you think that using the humane and green design guideline as a tool to assist integrating humane and green patterns is useful? Please answer yes or no and explain why.
5. How successful do you find integrating the humane and green patterns into one?
   Please rate from 1 to 10, with 1 being “extremely not successful” and 10 being “extremely successful.”

6. Would you use the humane and green pattern language and its simplified structure in one of your design projects? Please answer yes or no and explain why.

7. How useful is the humane and green pattern language in designing different office environments? Please rate from 1 to 10, with 1 being “not useful” and 10 being “very useful.”

8. Do you think that the proposed humane and green pattern language can be used as a tool to educate business owners on the importance of creating a successful workspace environment that reflects employee needs? Please answer yes or no and explain why.

9. Can this pattern language provide a helpful guide to a more-sustainable approach? Please answer yes or no and explain why.

10. Can applying this pattern language improve the work environment and its users? Please answer yes or no and explain why.

11. Are there ways that the provided pattern language can be improved? Please answer yes or no and explain why.

12. Please provide additional feedback about this pattern language in an effort to further improve it.

   Thank you for your replies.
CHAPTER IV
RESULTS

Chapter 4 of this graduate project focuses on demonstrating the Humane and Green Pattern Language and its simplified format, specifically adapted to the office and work environment.

The first phase of this chapter will discuss responses to the unstructured interviews with the owner and the three head managers of Sonic Electronix as well as the responses from the employee surveys. The next step will show the developed Humane and Green Pattern Language in a table format and then discuss selected patterns in detail using the simplified format of the pattern language (see Chapter 3, Methodology).

The Humane and Green Pattern Language was developed from the humane and green guidelines as well as from the identified problems and suggested solution (see Chapter 3, Methodology). To clarify how the patterns might be applied in a design project, the problems will be explained through discussing the problem within the selected office environment, and the recommendations will be illustrated by sketches or floor plans.

The next part of the chapter will demonstrate the steps of the developed design, which includes schematic and rendered design floor plans (See Figure 4. 34). The last part of this chapter will focus on replies from Expert Reviewer #1 and Expert Reviewer #2. Included are their replies, comments, and critiques to the 12 questions (outlined in Chapter 3, Methodology) regarding the developed Humane and Green Pattern Language, its simplified format, its success, and the graduate project in general.
Discussion of Owner’s and Head Managers’ Interviews

In the interview feedback from the owner and head managers, there were several issues that gave importance and guidance to the design development of the selected office environment. The owner discussed that he would like Sonic Electronix to maintain its casual culture and for the culture to be presented throughout the company in order to attract young generations. The owner mentioned a major need for teamwork, but the office layout does not support collaboration. He also saw a lack of organization in the marketing department in particular. He would like Sonic Electronix to be more sustainable and to learn more about the importance of space in increasing productivity, as he is looking to buy more stores.

The head managers see the importance of listening to employees’ feedback and allowing personalization in the workplace. However, the managers mentioned that they do not have shared boards in the hallways or specific areas to allow employees to share ideas in the workplace. The managers also mentioned that the work area is not organized and the space layout does not support collaboration among employees. They pointed out that the office chairs are old and not comfortable. They also noticed that some employees are not excited to come to work, as the workspace lacks motivation and the break rooms are neither well maintained nor accessible. They also noticed that some employees do not eat their lunch in the break room and prefer to eat outside in the sun even though there is no designated outside break room.

Discussion of Employee Surveys

Survey questions were given to 45 employees, 30 from the call center department and 15 from the marketing department. All employees from the marketing department
participated, but only 20 participated from the call center department. The survey was divided into the following sections: work modes (collaborate, focus, learn, and socialize), office layout, lighting, furniture, personalization, and sustainability. Each section had fixed questions and another area to write freely any comments or concerns regarding the topics.

In general, most employees gave collaboration work mode the highest importance percentage, the focus work mode took second place, and then the learn work mode and socialization were close in percentage. The employees noted that the work environment is dull and lacks daylight and organization. They also noted that the break rooms and conference room are limited in space and need durable flooring. At the same time, the employees raised a concern regarding the uncomfortable office furniture and chairs in the break rooms. Employees mentioned that they would be prouder if the company exercised more-sustainable practices.

The following are some of the comments written by the employees:
An employee from the marketing department wrote, “The office space feels very confined, dull, and boring; the break room is not separated from the workspace, which makes the entire space stink.” Another employee from the marketing department wrote that having all people from the department in one room is important to increase collaboration. The same employee also wrote, “My chair is very low quality and uncomfortable to sit on for a full day.”

**Developed Humane and Green Pattern Language**

The gathered information from the owner and head managers and the results from employee surveys were considered and used to develop the Humane and Green Pattern
Language for the selected office space. Also, the developed humane and green patterns and the *A Pattern Language* book were reviewed (see Chapter 3, Methodology).

<table>
<thead>
<tr>
<th>Main Category</th>
<th>Humane Aspect</th>
<th>Green Aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Space Layout</td>
<td>1A. Space Geometry and Functionality</td>
<td>3A. Enhance Collaboration</td>
</tr>
<tr>
<td></td>
<td>1A.1. Space Boundaries</td>
<td>3A.1. Degree of Privacy</td>
</tr>
<tr>
<td></td>
<td>1A.2. Spaces Within Boundaries</td>
<td>3A.2. Moving Partitions</td>
</tr>
<tr>
<td></td>
<td>1A.3. Visible Space Identity</td>
<td>3A.3. Conference Room</td>
</tr>
<tr>
<td></td>
<td>2A. Space Connectivity and Flow</td>
<td>4A. Ergonomic Furniture</td>
</tr>
<tr>
<td></td>
<td>2A.1. Space Entrance</td>
<td>4A.1. Comfortable Workstation</td>
</tr>
<tr>
<td></td>
<td>2A.2. Space Circulation</td>
<td>4A.2. Different Workstations</td>
</tr>
<tr>
<td>B. Lighting</td>
<td>1B. Natural Light and Views</td>
<td>2B. Artificial Lighting</td>
</tr>
<tr>
<td></td>
<td>1B.1. Utilizing the Windows</td>
<td>2B.1. Lighting Variety</td>
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<td>1B.3. Indoor Natural Elements</td>
<td>2B.2. Lighting Sensors</td>
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<td>1B.4. Outdoor Break Area</td>
<td>2B.3. CFL and LED lights</td>
</tr>
<tr>
<td>C. Personalization</td>
<td>1C. Space Personalization</td>
<td>2C. Choose Your Office Items</td>
</tr>
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<td></td>
<td>1C.1. Individual Spaces</td>
<td>2C.1. Office Chair</td>
</tr>
<tr>
<td></td>
<td>1C.2. Shared Inspirational Walls</td>
<td>2C.2. Office Accessories</td>
</tr>
<tr>
<td>D. Indoor Quality</td>
<td>1D. Movement Through Spaces</td>
<td>2D. Minimize Noise</td>
</tr>
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<td></td>
<td>1D.1. Flexible Office Space</td>
<td>2D.1. Solid Doors with Glass</td>
</tr>
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<td></td>
<td>1D.2. Short Passages</td>
<td>2D.2. Half- Private Office</td>
</tr>
<tr>
<td>E. Energy Saving</td>
<td>N/A</td>
<td>1E. Equipment and Appliances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1E.1. Energy Star Computer</td>
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<td></td>
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<td>1E.2. Break Room Refrigerator</td>
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<tr>
<td></td>
<td></td>
<td>1E.3. Break Room Microwave</td>
</tr>
<tr>
<td>F. Good Material</td>
<td>Material selection can have a humane aspect if the selection was made based on users’ needs</td>
<td>1F. Material Reuse and Recycle</td>
</tr>
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<td></td>
<td>1F.1. Low VOC Paint</td>
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<tr>
<td></td>
<td></td>
<td>1F.2. Linoleum Flooring</td>
</tr>
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Table 4.1. Humane and Green Pattern Language
Humane and Green Patterns

The following are the selected patterns from the Humane and Green Pattern Language, which will be explained in detail using the simplified format of the pattern language (see Chapter 3, Methodology).

A. Space Layout

Humane Aspect:

1A. Space Geometry and Functionality

1A.1. Space Boundaries

1A.2. Spaces Within Boundaries

2A. Space Connectivity and Flow

2A.2. Space Circulation

Green Aspect:

3A. Enhance Collaboration

3A.3. Conference Room

4A. Ergonomic Furniture

4A.2. Different Workstations

B. Lighting

Humane Aspect:

1B. Natural Light and Views

1B.4. Outdoor Break Area

Green Aspect:

2B. Artificial Lighting Control

2B.2. Lighting Sensors
C. Personalization

**Humane Aspect:**

1C. Space Personalization

1C.2. Shared Inspirational Walls

**Green Aspect:**

2C. Choose Your Office Items

2C.1. Ergonomic Office Chair

D. Indoor Quality

**Humane Aspect:**

1D. Movement Through Spaces

1D.1. Flexible Office Spaces

**Green Aspect:**

2D. Minimize Noise

2D.1. Solid Doors with Glass

E. Energy Saving

**Green Aspect:**

1E. Equipment and Appliances

1E.1. Energy Star Computer

F. Good Material

1F. Material Reuse and Recycle

1F.2. Linoleum Flooring
1A.1. Space Boundaries

Figure 4.1. Space Boundaries Example

According to Alexander (2002), good geometry increases comfort for the users, as it can be achieved through a step-by-step unfolding process of space design. The step-by-step unfolding process creates space boundaries based on the hierarchy of the spaces, which are essential to maintain space identity and understand the relationship among spaces.

**Problem in the selected office space:**

There is not a clear understanding of space identity and the importance of space adjustments; therefore, there is a lack of space boundaries. For example, the kitchen space is located behind an employee’s cubicle. The conference room is used as a meeting room when it is not occupied as a break room. The kitchen area is far from the break room.

**Proposed solution:**

- Understand space functions and the relationship among different spaces
- Study space entrances and exits, then create a sketch design with space boundaries
- Unfold the space boundaries (clusters) step by step in order of importance, respecting the connection among spaces and their geometry (Alexander, 2002)

- In Sonic Electronix, the following major clusters were developed:

  1- Reception/Lounge Area
  2- Enclosed Collaborative/Meeting Rooms
  3- Open Office Area
  4- Inside and Outside Break Rooms
  5- ADA Restrooms
  6- Storage and Filing Area
Figure 4.3. Reception/ Lounge Area

Figure 4.3. Copyright 2013 by Dalia Hazboun.

Figure 4.4. Enclosed Collaborative/Meeting Room

Figure 4.4. Copyright 2013 by Dalia Hazboun.
Figure 4.5. Open Office Area

Figure 4.5. Copyright 2013 by Dalia Hazboun.

Figure 4.6. Inside and Outside Break Rooms

Figure 4.6. Copyright by Dalia Hazboun.
Figure 4.7. ADA Restrooms and Storage Areas

Figure 4.7. Copyright 2013 by Dalia Hazboun.
1A.2. Spaces Within Boundaries

Figure 4.8. Spaces Within Boundaries

Figure 4.8. Copyright 2013 by Dalia Hazboun.

Within each boundary, there are smaller spaces that unfold to enhance the identity of the space (Alexander, 2002). For example, the step-by-step process of folding a simple piece of paper constructively explains how to develop a complex form. Upon following this stepwise process, one can create a bird, a flower, or any other origami object (McCormack, Dorin, & Innocent, 2004).

**Problem in the selected office space:**

Space boundaries (clusters) do not consist of smaller spaces. The entire office space is looked at as one big boundary with mixed functions. For example, the kitchen is open to the entire space yet far from the break area. Cubicles are placed to fill the entire space without taking into consideration the importance of enhancing collaboration in the marketing department.

**Proposed solution:**

- After identifying the major boundaries (clusters) within the space, start
introducing smaller spaces within each boundary (cluster) until the entire project is completed

- In Sonic Electronix, the following smaller spaces were created:

1- Reception Area
   1.1. Entrance
   1.2. Reception Desk
   1.3. Counter Tables
   1.4. Seating Area

2- Enclosed Collaborative/Meeting Rooms
   2.1. Managers’ Office
   2.2. Collaboration Room
   2.3. Conference Room

3- Open Office Area
   3.1. Cubicles
   3.2. Individual Offices

4- Break Rooms
   4.1. Inside Break Area
   4.2. Outside Break Area

5- ADA Restrooms
   5.1. ADA-Accessible Sink
   5.2. ADA-Accessible Toilet

6- Storage and Filing Area
   6.1. Filing Units and Staff Lockers
Figure 4.9. Smaller Boundaries

Figure 4.9. Copyright 2013 by Dalia Hazboun.
- After creating smaller boundaries, create walls, add furniture and plants

Figure 4.10. Floor Plan with Furniture

*Figure 4.10. Copyright 2013 by Dalia Hazboun.*
2A.2. Space Circulation

Figure 4.11. Space Circulation Example

Figure 4.11. Copyright 2013 by Dalia Hazboun.

Connecting spaces to one another in the work environment is key in improving employee work-process interactions, social interactions, interactions linked to seeking expert advice, and decision making (Peponis et al., 2007; Wineman et al., 2012). Clear accessibility (circulation) to different spaces in the work environment can increase employees’ positive attitudes and overall productivity by providing equal opportunity access to team workspaces, informal spaces, and the presence of natural light.

Problem in the selected office space:

Since the entire office space was looked at as one big boundary, there isn’t clear primary or secondary circulation. Also there isn’t clear walkway among the desks.

Proposed solution:

- The primary circulation can be created by studying the entrances and exists of the space
- The secondary circulation can be created from the unfolding of the
boundaries.

- Shared spaces such as break rooms, restrooms, and the conference room need to be easily accessible to allow for equal opportunity access
- Main circulations need to always be clear and not blocked by furniture

Figure 4.12. Primary Circulation

*Figure 4.12. Copyright 2013 by Dalia Hazboun.*
Figure 4.13. Secondary Circulation

Figure 4.13. Copyright 2013 by Dalia Hazboun.
3A.3. Conference Room

Figure 4.14. Conference Room Example

Figure 4.14. Copyright 2013 by Knoll.

The conference room is one of the most important rooms in the office space, as it can be used as a tool to enhance collaboration among employees.

Problem in the selected office space:

In Sonic Electronix, the marketing department is connected to the purchasing department. Sometimes, managers need to meet with employees from both departments; however, there isn’t one space accessible to both departments. In the current space, the conference room in the marketing department is limited in space and is far away from the purchasing department. The conference room also lacks natural light and views to the outdoors.

Proposed solution:

- If possible, place the conference room accessible to different departments to
enhance collaboration in ideas among employees

- Place the conference room in a prime location—for example, close to windows, especially if most employees do not have access to a window

- Having windows in the conference room allows for equal opportunity to access natural light, especially in an office space that lacks windows

- For window covering, roller bottom-up shades made of visually transparent materials are recommended, as they can offer increased flexibility by shielding sunlight while protecting occupants’ views even when lowered (Bonda & Sosnowchok, 2007, p. 145)

- Window coverings are most effective when installed with control systems such as Lutron’s Sivoia QED (Quiet Electronic Drive), aimed to save energy and provide occupants a convenient way to manage sunlight

Figure 4.15. Conference Room with Two Windows

Figure 4.15. Copyright 2013 by Dalia Hazboun.
4A.2. Different Workstations

It is important to have a variety of green workstations that can be adjusted to individuals’ needs and reflect the culture of the organization. In every workspace, workstations need to support the function of the space.

- **Problem in the selected office space:**

  In Sonic Electronix, the workstations consist mainly of cubicles. The cubicles are dull in style and are not environmentally friendly. While some employees need to focus on individual tasks in their cubicles, other employees do not have shared workstations to enhance collaboration.

*Proposed solution:*
- It is important to understand the function of each workspace in order to select the proper workstations to enhance employee performance. For example, in the conference room, select a big table that will allow employees to share ideas and discuss current matters in the work environment.

- Use height-adjustable desks, which can offer personalized solutions for employees with different sizes and needs.

- In selecting workstations, select office furniture with recycled materials and understand the policies and green practices of the company making it; green furniture will assist in making the company greener.

Figure 4.17. Variety of Workstations

*Figure 4.17. Copyright 2013 by Dalia Hazboun.*
1B.4. Outdoor Break Area

Figure 4.18. Example of an Outdoor Break Area

Figure 4.18. Copyright 2009 by Natural Habitat Landscaping.

Problem in the selected office space:

Sonic Electronix employees do not have direct access to windows; therefore, they lack access to some beneficial features of the outdoor environment such as natural light and scenery. At the same time, employees complained about having limited break room space.

Proposed solution:

- Create an outdoor break room easily accessible to all employees
- Place the outdoor break area close to the inside break room, forming a virtually continuous break area
- Use a decorative fence to create an edge
- Use native plants for the landscaping and different outdoor chairs and benches
Figure 4.19. Outdoor Break Area

Figure 4.19. Copyright 2013 by Dalia Hazboun.

Figure 4.20. Outdoor Break Area’s Dimensions

Figure 4.20. Copyright 2013 by Dalia Hazboun.
2B.2. Lighting Sensors

Figure 4.21. Lighting Sensors

Figure 4.21. Copyright 2013 by Legrand.

Lighting is an important design element of any office space. There are three components to proper lighting: the source, the distribution, and the controls. When the three components are integrated into a well-designed plan, not only is the experience of the employees maximized, but energy use is optimized.

*Problem in the selected office space:*

In Sonic Electronix, there is a lack of lighting sensors, which can reduce energy costs for the entire building.

*Proposed solution:*

- Lighting sensors are used as a lighting management tool to increase occupant comfort and save the maximum amount of energy and money—up to 50% is attainable.
- Occupancy sensors encompass a variety of control devices with different technologies that react to the presence or absence of movement within the
space (Bonda & Sonsnowchik, 2007, pp. 84–85)

- Use Passive Infrared Occupancy Sensors in spaces that are not regularly occupied such as copy, conference, storage, and restroom areas

Figure 4.22 Passive Infrared Occupancy Sensors

Figure 4.22. Copyright 2013 by Dalia Hazboun.
1C.2. Shared Inspirational Walls

Figure 4.23. Example of Shared Inspirational Walls

Allowing employees to personalize their workspaces with items reflecting the team’s goals and achievements offers benefits for companies including higher levels of employee morale, enhanced organizational and social climates, and reduced turnover (Wells, 2000).

Problem in the selected office space:

In the marketing department, there is no designated wall where employees can collectively show their achievements, goals, or inspirational articles or images.

Proposed solution:
- Select a major wall in the office space based on space circulations.

- Employees in the marketing department are creative and need inspiration to enhance their ideas and increase their productivity; according to Wells (2000), teams that collectively personalize their spaces with items and images reflecting the team’s goals and achievements are more creative in nature.

- The selected wall faces the entire space, employees walking into the office will directly notice it and since all employees use the inside and outside break rooms, the selected wall will be viewed by all employees at least once a day.

Figure 4.24. Selected Inspirational Wall

Figure 4.24. Copyright 2013 by Dalia Hazboun.
2C.1. Ergonomic Office Chair

Figure 4.25. Ergonomic Office Chairs

*Figure 4.25. Copyright 2010 by OSHA.*

An office chair must be well designed and appropriately adjusted as an essential element of a safe and productive workstation. A good office chair design provides necessary support to the back, legs, buttocks, and arms while reducing exposure to awkward postures, contact stress, and forceful exertions. It is also important to allow employees to select their office chair to suit their physical needs.

**Problem in the selected office space:**

Chair comfort in particular is important in any office configuration; 73% of office workers reported that it influenced their personal comfort a great deal. At Sonic Electronix, employees complained about the uncomfortable office chairs and the fact that they cannot choose an office chair that suits their physical needs and work demands.

**Proposed solution:**

- Select different ergonomic office chairs and allow employees to choose the one most suitable for their physical characteristics
- The backrest of the selected chair should conform to the natural curve of the
- The seat must be comfortable and allow the feet to rest flat on the floor
- The chair should have casters that allow easy movement along the floor
- Allowing employees to select the proper office chair helps employees exert control over their office environment and increases job satisfaction (Wells, 2000)

Figure 4.26. Variety of Office Chairs

![Figure 4.26. Variety of Office Chairs](image-url)
1D.1. Flexible Office Spaces

Figure 4.27. Tables with Casters to Enhance Unplanned Interactions

Office space provides two kinds of interactions: planned and unplanned. Planned interactions are usually associated with scheduled meetings in conference rooms or private individual offices. On the other hand, unplanned interactions can occur everywhere and can arise as a byproduct of movements in and around work areas (Peponis & Wineman, 2002).

Problem in the selected office space:

In most office spaces, designers do not pay attention to the unplanned interactions that happen in the work environment and their importance in enhancing collaboration and social climates. After observing interactions among employees and the way they utilize the office space, we noticed that unplanned interactions occur consistently in the work environment due to the high demand for collaboration. However, the office space is not flexible and does not support unplanned interactions.
**Proposed solution:**

- Designers need to observe employees’ interactions and movement throughout the day.
- In the major areas where unplanned interactions occur, place small office tables that can support collaboration.
- Select tables with casters to allow employees to relocate the tables if needed during the day.

*Figure 4.28. Flexible Office Tables*

*Figure 4.28. Copyright 2013 by Dalia Hazboun.*
2D.1. Solid Doors with Glass

Figure 4.29. Glazed Door Example

The use of glazed doors in office environments is highly recommended, as it provides a sense of controlled connection between spaces and minimizes noise.

*Problem in the selected office space:*

In small office environments with open-plan concepts and closed offices, there is always a need to have a sense of visual connection between spaces yet optimize acoustic isolation. Noise is considered a major concern in open office plans. Uncontrollable sounds generated by others or unpredictable sounds (e.g., telephone rings) cause stress to other workers.
Proposed solution:

- Use glazed doors in closed office spaces to allow for different degrees of privacy
- Add door panel curtains to allow for complete privacy when needed
- Use sustainable doors with recycled contents and materials

Figure 4.30. Placement of Glazed Doors

Figure 4.30. Copyright 2013 by Dalia Hazboun.
Problem in the selected office space:

Energy resources are becoming limited, and this makes the creation of energy-efficient equipment such as computers vital. In office buildings, office computers are one of the largest contributors to electrical loads.

Proposed solution:

- Energy star computers cost almost the same as non-labeled computers; however, the estimated savings can be significant, especially in office designs
- Use Energy Star computers with power management features to consume 20–65% less energy (EPA, 2009)
1F.2. Linoleum Flooring

Figure 4.32. Linoleum Flooring

Linoleum flooring is one of the most eco-friendly floors, as it is made from natural materials such as linseed oil, resins, recycled wood flour, cork dust, limestone, and mineral pigments mounted on jute backing. It is naturally anti-bacterial and biodegradable (http://www.armstrong.com/flooring/linoleum.html).

Problem in the selected office space:

Employees of Sonic Electronix noted that the break rooms and conference room need durable flooring. Also, employees mentioned that they will be prouder if the office space uses sustainable materials and if the company exercises more-sustainable practices.

Proposed solution:

- Use linoleum flooring because it is durable and eco-friendly
- Linoleum is available in traditional marbled patterns, solid colors, contemporary flecked designs, or graphic patterns. Therefore, select the suitable colors that can reflect the logo of the company and can hide dirt especially for high traffic areas
Figure 4.33. Sonic Electronix’s Flooring

Figure 4.33. Copyright 2013 by Dalia Hazboun.
Design Development Steps

Figure 4.34. Steps of the Design Development
Figure 4.34. Continue-Steps of the Design Development
Post-Design Evaluation Results

A week after the created and adopted Pattern Language and Questionnaire were given to the experts, the following replies were received.

1. Do you find the structure of the integrated humane and green pattern language easy to follow? Please rate from 1 to 10, with 1 being “extremely difficult to follow” and 10 being “extremely easy to follow.”

   *Reply of Expert Reviewer #1: 7- Yes, fairly easy to follow.*

   *Reply of Expert Reviewer #2: 9- For a person who has knowledge and good understanding of the Pattern Language, the language was easy to follow.*

2. Is the pattern language easy to understand? Please rate from 1 to 10, with 1 being “extremely difficult to understand” and 10 being “extremely easy to understand.”

   *Reply of Expert Reviewer #1: 7- Yes the pattern language is easy to understand, but it would have been more helpful if you discussed all of the developed patterns and applied them to the selected floor plan.*

   *Reply of Expert Reviewer #2: 9- As I mentioned earlier, for a person who has knowledge and had previously worked with the pattern language, the pattern language is easy to understand.*

3. Would you make any changes to the following simplified pattern language structure? Please note which ones and why.

   a) Number and Title of the Pattern
   b) Description of the Pattern
   c) Inspirational Image
   d) Problem Description
e) Proposed Solution

f) Solution’s Application Sketch or Floor Plan

*Reply of Expert Reviewer #1:* No, the simplified elements are easy to follow.

*Reply of Expert Reviewer #2:* I found the “description of the pattern” beneficial for those who are not familiar with the pattern language.

4. Do you think that using the humane and green design guideline as a tool to assist integrating humane and green patterns is useful? Please answer yes or no and explain why.

*Reply of Expert Reviewer #1:* Yes, the guideline can be used by other designers and architects to help integrate humane and green patterns into one language.

*Reply of Expert Reviewer #2:* Yes, it assists in understanding the humane and green patterns, especially for those who are not familiar with the pattern language.

5. How successful do you find integrating the humane and green patterns into one? Please rate from 1 to 10, with 1 being “extremely not successful” and 10 being “extremely successful.”

*Reply of Expert Reviewer #1:* 8- Overall, it is a good attempt.

*Reply of Expert Reviewer #2:* 6- I find that there was more attention given to the humane patterns than to the green patterns. The rest of the green principles should have been integrated such as water conservation and site planning and design.

6. Would you use the humane and green pattern language and its simplified structure in one of your design projects? Please answer yes or no and explain why.

*Reply of Expert Reviewer #1:* Yes.

*Reply of Expert Reviewer #2:* Yes, but I would add and modify some of its content to
reflect the need of the new design project.

7. How useful is the humane and green pattern language in designing different office environments? Please rate from 1 to 10, with 1 being “not useful” and 10 being “very useful.”

Reply of Expert Reviewer #1: 9- It is useful, especially as the humane and green pattern language was developed from general issues in many office environments. It would be interesting to see this pattern language applied to other office environments to truly evaluate the success of this pattern language.

Reply of Expert Reviewer #2: 7- It should be useful at least as an outline.

8. Do you think that the proposed humane and green pattern language can be used as a tool to educate business owners on the importance of creating a successful workspace environment that reflects employee needs? Please answer yes or no and explain why.

Reply of Expert Reviewer #1: Yes, I believe so.

Reply of Expert Reviewer #2: Yes, since the proposed pattern language reflects employees’ needs and the culture of the organization.

9. Can this pattern language provide a helpful guide to a more-sustainable approach? Please answer yes or no and explain why.

Reply of Expert Reviewer #1: Yes, especially since the pattern language so carefully focuses on sustainability, green design, energy efficiency, and their applications into design of an everyday environment.

Reply of Expert Reviewer #2: Yes, I believe so.

10. Can applying this pattern language improve the work environment and its users?
Please answer yes or no and explain why.

Reply of Expert Reviewer #1: Yes, I believe so.

Reply of Expert Reviewer #2: Yes, since the patterns were based on the concerns of the owners, head managers, and employees. This would definitely improve the work environment. Since employees’ concerns were reflected in interviews and pattern—and solutions were provided—it is now up to the owner to bring these solutions to life to improve the work environment.

11. Are there ways that the provided pattern language can be improved? Please answer yes or no and explain why.

Reply of Expert Reviewer #1: I believe that there is always room for improvement, especially with sustainable approaches. If the pattern language will be provided to a business owner of an office environment, I would recommend adding specific information such as where the services could be found in the area.

Reply of Expert Reviewer #2: Yes. The main thing is that the green patterns need to be discussed more in depth.

12. Please provide additional feedback about this pattern language in an effort to further improve it.

Reply of Expert Reviewer #1: Focus on the pattern titles. Some of the titles you provided are good as they describe a feeling or are descriptive (for example, “Shared Inspirational Walls”), but others don’t create an image in the mind of the reader (for example, “Linoleum Flooring”). Each pattern title should be more descriptive (for example, “Linoleum Flooring” could be “Durable Eco-Friendly Flooring”).

Reply of Expert Reviewer #2: In general, integrating the humane and green
patterns into one language is a good start, but you need to understand that there is much more to be done, and it would have been more helpful if each pattern of the pattern language were presented in depth.
CHAPTER V
DISCUSSION

The purpose of this graduate project was to propose a pattern language for an office environment that would integrate humane patterns with green patterns in an easy and applicable manner in an effort to improve the workplace. The design proposal aimed to solve current issues in the work environment by integrating not only the technical aspect of sustainable design but also the humane aspect. Furthermore, the outcome of this project provided a constructive design framework that could possibly be used by interior designers and architects to assist business owners in creating humane and green workplaces responsive to employees’ needs and reflecting the culture of the organization.

To achieve this purpose, the first step was to visit the selected retail store “Sonic Electronix” several times to observe the site and the way that working personnel utilized the spaces. Interviews were conducted with the owner and three of the head managers. A survey was given to the employees to discuss the current concerns in the office environment and to listen to their feedback. Based on the survey results, the series of interviews and observations, and the literature review, the research team developed a set of guidelines divided into humane and green aspects. The guidelines assisted in developing humane and green patterns. The developed patterns and the related patterns from A Pattern Language book helped integrate the humane and green patterns into one language. The developed patterns were applied to the selected office environment. The adopted pattern language was then evaluated by two experts in pattern language, and suggestions were made by the experts.
Discussion of Findings and Modifications

Post-design evaluation of the project involved evaluation by two experts in the field of pattern language. The experts evaluated the developed humane and green pattern language, the simplified structure of pattern, and its outcome. Chapter 3, Methodology, and Chapter 4, Results, focused on the characteristics of the expert reviewers, the questions formed for them, and their responses, suggestions, and feedback.

Expert Reviewer #1 found the pattern language easy to understand and follow but thought that developing the rest of the patterns and applying them to the selected space would have been more helpful for those unfamiliar with pattern language theory. The expert advice was very beneficial in assisting readers to understand the pattern language and its developed patterns. Developing and applying each pattern was outside the scope of this thesis. Expert Reviewer #2 found the simplified pattern structure easy to follow and the description of the pattern beneficial.

Expert Reviewer #1 found that the attempt of integrating humane and green patterns into one language was good, but Expert Reviewer #2 noted that there was more attention given to the humane patterns than to the green patterns. The rest of the green principles should have been integrated. Expert Reviewer #1 found that the pattern language is useful in designing different office environments, especially as the language was developed from general issues in many office environments. Also, the expert thought that it would be interesting to see this pattern language applied to other office environments to truly evaluate the success of this pattern language.

Expert Reviewer #2 found that since the patterns in the pattern language were developed based on the concerns of the owner, head managers, and employees, the
pattern language would definitely improve the work environment. The expert also mentioned that it is up to the owner to bring the solutions to life to improve the work environment.

Both experts thought that the pattern language can be improved. Expert Reviewer #1 suggested useful strategies to make patterns more applicable for the owner and employees of the office. For example, the expert recommended adding specific information such as where the services could be found in the area. This suggestion is considered beneficial especially for practicing interior designers and business owners, but this is outside the scope of this thesis. Expert Reviewer #2 found that the green patterns need to be discussed more in depth.

Also, Expert Reviewer #1 made a note that some patterns should have more-descriptive titles. Though effort was made to select the best title for each pattern, the expert was not satisfied with some of the pattern titles and recommended writing more-descriptive titles.

**Implications**

The approach for this project was geared towards developing a pattern language for a casual office space that integrates humane and green patterns. Although this concept was developed for a casual work environment, it could also be a good idea to apply the humane and green pattern language to other office environments such as call centers, formal open office spaces, and health care offices.

In the United States, the practice of work is always changing, and organizations are constantly facing challenges to cope with and adapt to the changes. The approach of developing a humane and green pattern language used in this project can help designers,
architects, and business owners design improved work environments. However, the constructive design framework must be adjusted to fit the needs of the users and reflect the culture of the organization. Furthermore, in the future, this approach may be modified even more to create a constructive design framework for other types of spaces and facilities such as restaurants, stores, hotels, hospitals, etc.

Due to time constraints, there were two main shortcomings faced in this project: Not all the developed patterns were presented in depth, and not all patterns were applied to the selected office space. Also, even though the intent was to actually test the developed pattern language and a post-test evaluation, the intent was not accomplished.

Hopefully, a future graduate student could apply the integrated pattern language in designing a work environment and present a post-test evaluation.

**Conclusion**

This project attempted to create a design framework responsive to employee needs and reflecting the culture of the organization by using Alexander’s Pattern Language Theory (1977) and the humane and green aspects of design to assist integrating the patterns into one language. The research and design were an effort aimed to also highlight the importance of understanding the changes and challenges in work environments.

Although several researchers have attempted to explore various applications of the pattern languages and create a more-sustainable design in a variety of fields, no one to our knowledge attempted to integrate humane and green patterns into one language and apply it to improve the work environment.

Going through various phases of this project, the research team noticed the importance of understanding the work environment and its several aspects. From the
preliminary phase of research and idea gathering, the sincere hope was that the study would be valuable as a tool to assist design professionals and business owners in designing humane and green work environments. Moreover, the hope is that the research and the design will inspire future researchers to explore the challenges of work environments and shed more light on the importance of listening to employee needs and feedback.
REFERENCES


the Environment, 25(1), 537- 566.


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