INTEGRATING HUMANE AND GREEN PATTERNS IN A RESTAURANT SETTING

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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ABSTRACT

INTEGRATING HUMANE AND GREEN PATTERNS IN A RESTAURANT SETTING
by
Behnoosh Ashtari
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The purpose of this graduate project was to achieve a more comprehensive sustainable restaurant design by taking into consideration both Humane and Green design patterns. The approach was based on noted architect and academic Christopher Alexander’s design theory of “Pattern Language”, and sought to indicate how this theory can support the process of design. This graduate project presents an adapted Pattern Language framework, for structuring and presenting more sustainable fieldwork, and considers the broad implications of patterns for the development of restaurant settings. Developed patterns can be used as a framework to assist the designers and individuals who might experience restaurant design. An under-renovation restaurant located in Northridge, California has been selected in order to clarify the implications of patterns. A series of observations and interviews took place aiming to determine the most common problems in a restaurant context. Alexander’s Pattern Language was applied and adopted based on the need of the design location, this process led to the suggested solutions and conclusions with a conceptual design proposal. Accordingly, a series of Humane and Green patterns developed which addresses those needs was applied in design and building process. The created Pattern Language was then evaluated by two experts in Pattern Language, and suggestions were made by the experts.
CHAPTER I
INTRODUCTION

The subject of Green design (sustainable design) has been developed in the design profession due to recent global concerns about the planet’s future and the need of protecting the environment. Today’s primary focus of Green design has been limited to technical aspects of design in order to keep it economical and energy efficient, however, there has been no significant attention to the Humane side of design including human wholeness and spirit of place (Pontikis, 2010). This existing lack in the combination of Humane and Green designs necessitates the development of a field that combines theoretical and practical knowledge of both philosophies. The current project aims to fill this design gap by pattern language-based approach particularly in a restaurant setting as one of the most energy and resource intensive branches of the hospitalities industry. The approach is based on the original work of Alexander (1979) in Pattern Language which suggested a new theory of architecture to enable the people to design for themselves by describing the possible solutions for the design problems which occurs over and over again (Alexander, 1979). In general, the core of this project is to support the design process, rather than structuring of a specific design proposal, although; the process has been illustrated through renovation of a Persian restaurant located in Northridge, California.

This paper is a detailed description of my experience in adopting and practicing of Pattern Language framework for a restaurant setting, considering both Humane and Green patterns. The results have implications for designers and individuals who might experience restaurant design, aiming to promote humane wellness as well as
environmental sustainability. The adopted patterns can be used as the practical solutions for some questions that might be posed in the process of designing a restaurant.

**Statement of the Problem**

Even though human actions have been impacting the earth’s environment for many thousands of years, the recent damaging results of human activities can be noticed everywhere (Solan, 2009). Consequently, the need to protect and manage the environmental sources more efficiently has led to the development of the subject of sustainability in every profession. A Sustainable development is defined as one that "meets present needs without compromising the ability of future generations to meet their needs" (WECD, 1987). Because of the growing tendency of being sustainable, finding techniques to create a sustainable built environment is currently receiving a great deal of attention from architects and designers. A variety of techniques has been utilized to reduce energy consumption, water and material resources and diminish any harmful impact on the environment (McLennan, 2004). As a result, today’s modern buildings are more successful in terms of being green and energy efficient; but they have failed for the most past in considering another important criterion of the building: the humane side that includes the wholeness and the spirit of place (Pontikis, 2010). Current concept of sustainability in architecture has been criticized by many researches because of its overwhelming dependency on technology. The need of making a new perspective and substantial contribution to architecture has been identified in order to create a truly sustainable environment (Alexander, 2004; McDonough, 2005; Pontikis, 2010; Van der Ryn & Crown, 1996). In fact, the key of reaching an environmental respectful design is
not only to reduce the energy consumption, but also to design sensitive to human needs, cultural specificity, and its’ surroundings. Along with this belief, better quality might be achieved by integrating both green and human aspects of design in a built environment.

In addition, the hospitality industry, as one of the largest industries in the world, is an important contributor to the current environmental challenges. “Within the hospitality industry, sustainability awareness is growing but is still in its very early stages; energy efficiency in facility design is frequently low and the resulting environmental impacts are typically greater than those caused by other types of buildings of a similar size” (Solan, 2009). Moreover, the restaurant industry particularly is known as the second largest employer in the United States, thus, green business models are developing as a critical concept in the restaurants (Glibson, 2009).

![Figure 5.1. Commercial Building Energy Cost per Square Foot (National Restaurant Association 2004 Restaurant Industry Operations Report)](image)

Researches demonstrate out of the nearly one million restaurants operating in the United States, there are only about 300 that are trying to make a difference in recent environmental challenges (Stukin, 2007). A survey by American Restaurant Associations
(2012) shows “92% of adults still enjoy going to restaurants, 41% consider the restaurants as an essential part of their lifestyle, and 84% believe going out to a restaurant is a nice break from the monotony of daily life.” But nowadays due to economic uncertainty and home lower perceived (or actual) home equity has eroded consumer confidence. The rising costs of food and energy are also the top concerns for consumers. Eventually, when people go out for a meal, they want to be sure it’s worth the investment. As a result, “operators should focus on providing consistently solid basics (service, food, décor), while developing qualities that differentiate them from the other competitors in the industry” (Higar, 2008).

Understanding existing sustainability issues due to overwhelming reliability on technology, necessitates taking a more holistically approach to the current concept of sustainable design. In addition, the need for new considerations in restaurant settings has also been identified in terms of energy consumption and humane satisfactions. By declaring these facts, designing the under construction restaurant has been proposed in
order to apply and examine both Green and Humane principles in its designing process. The design approach is based on the theory of one of the main supporters of this new design process, Christopher Alexander’s Pattern Language method.

**Purpose of the Study**

There were three essential purposes behind this project. First, the main goal of this project was to promote the restaurant’s environmental quality by taking into consideration both Green and Humane needs. Second, the key theoretical purpose of the project was to formulate and adopt a restaurant Pattern Language including both Humane and Green patterns in order to be applied by architects, builders, designers and individuals who might experience restaurant design. Third purpose was to clarify the implications of adopted patterns by applying them into the design process of the selected restaurant located in Northridge, CA.

Overall, the outcome of this project presented a set of guidelines to the “Humane-Green design”, and contributed to the knowledge of designing restaurant environments through the experience of developing and utilizing a “Humane, Green Design Pattern Language”.

**Methodology**

The Pattern Language was used as the basic method to develop the requirement for this project; this method was introduced in architecture originally by Christopher Alexander in the mid 70’s. The core of the philosophy is that people could design for themselves their own houses, gardens, streets, and communities. Basically, a language design included elements which are called patterns. According to Alexander’s (1977)
“Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use the solution a million times over, without ever doing it the same way twice” (p. x).

In this project, for better understanding and evaluating the design process, an under-renovation restaurant located in Northridge, CA was selected. Most common problems in the restaurant were noted through series of observations, interviews, and literature reviews. A checklist was provided and the patterns were adopted based on the need of the design location, including both identified problems and suggested solutions. The effects of the described patterns were demonstrated through the design proposal for the selected restaurant. Lastly, the adopted restaurant’s Pattern Language was evaluated by two experts in Pattern Language, and suggestions were made by the experts

Definitions

1. **Anchors**: Refers to design features that offer the potential for limiting access to the person, which may be permanent (walls, columns, windows, and partitions) or movable (furniture or plants), but in either case provide temporary screening from the sight, sound, or proximity of others (Robson, 2008).

2. **Ambient factors**: Factors that affect the atmosphere of the environment, such as color, sound, lighting, and scent (Robson, 1999).

3. **Biophilia**: Refers to that humans have an innate tendency to focus on life and lifelike processes (Wilson, 1984).

4. **Booths**: Tables with permanently fixed seating and solid structure divider on three sides of the table (Kims & Robson, 2004).
5. **Culture and meaning of place:** A place basically defines as how we see ourselves in relation to others and a particular environment, and explains the emotional bond we may develop to that place over time. (Gifford, 2002).

6. **Ecological design:** Refers to an integrative and holistic design principle that minimizes the destruction of the environment by taking into consideration all living creatures (Van der Ryan & Cowen, 1996).

7. **Green design:** The objective of green design is "to eliminate negative environmental impact completely through skillful, sensitive design" (McLellan, 2004).

8. **Human green design:** Is the integration of humane design with green design and aims in creating environments which sustain and regenerate nature while preserving and enhancing human health, spirituality, and well-being. (Pontikis, 2010).

9. **Pattern languages:** Originally introduced by Christopher Alexander, it is a format for describing a solution to a design problem. “Each pattern describes a problem which occurs over and over again in our environment” (Alexander, Ishikawa, Silverstein, Jacobson, Fiksdahl-King, & Angel, 1977).

10. **Sustainability:** “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”(Brundtland Commission, United Nations General Assembly, 1987).

### Assumptions

This project was created based upon certain assumptions regarding the design experts who were interviewed and who participated in the design evaluation survey.

- The design experts had the appropriate qualifications in pattern language and Christopher Alexander’s theories.
The design experts were knowledgeable about sustainable design and its principles.

The design experts read and carefully critiqued the reinterpreted and revised Pattern Language and its outcomes.

The design experts could understand the items in the Design Study.

The design experts completed the questionnaire form thoroughly and honestly.

The design experts participated in the formative evaluation without pressure from others.

Limitations

This project will add to the understanding of the Pattern Language that guides and initiates Humane-Green design considerations of a restaurant environment, however, certain limitations to the project exist:

- The Humane-Green Pattern Language was only geared towards architects, designers, and builders of a casual restaurant environment and might not be applied to other restaurant types.

- This project had a modest budget; higher budget was needed in order to conduct major changes or additions.

- This project primarily looked into the structure of the patterns and focus on function, geometry, sustainability, and ecology. The pattern structure investigation will not focus on other important aspects of patterns, such as their interconnections and sequence of unfolding within the structure of the project, or rating value. It is the hope of the author that these other three aspects will be investigated in the future by other researchers.
CHAPTER II
REVIEW OF LITERATURE

Literature review for this project concentrated on areas related to the subject. These areas include: research on Sustainable design, Humane-Green design, Pattern Language, and Restaurant Design.

*Sustainable Design*

"Sustainable development is the development which meets the needs of the present without compromising the ability of future generation to meet their own needs" (World Commission on Environment and Development, 1987, p. 4).

For many thousands of years, man’s impact on the environment was insignificant; but at the dawn of the industrial revolution all this changed. Nowadays people consume more of the earth’s resources than the earth can regenerate (Philip, 2009). As Green Building Council (2010) reported, the built environment is growing globally at a rate which is three times faster than the growth rate of population. In the United States buildings consume 39% of total energy use, utilize 40% of raw materials, create 30% waste output, and add 38% of carbon emissions into the atmosphere. These practices affect the environment negatively and cause pollution, resource depletion, and climate change (USGBC, 2010).

By the 1960’s concern about future energy supplies led to interest in renewable sources, specifically in the superior development of solar, wind, water power, and in the use of planet and animal sources (Zeibar, 1960). The Brundtland commission of the United Nations on March 20th, 1987, first used the word “Sustainability” in connection with the environment and defined sustainable development as: “development which
meets the needs of the present without compromising the ability of future generations to meet their own needs”.

Sustainability introduced as one of the main concepts of this decade which is influencing the design of global government policy, economics, energy resources, technology, manufacturing, community planning, and architecture (Zeiber, 1996). The Green design, also known as sustainable design, is a design method that reduces the negative impact of buildings on the environment (USGBS, 2006). Sustainable buildings are designed in order to decrease reliability on nonrenewable resources, to consume only the vital sources, and to change consumption of resources to recycled or recyclable products, and consequently reducing waste (Mandler & Odell, 2000). According to Williams (2007) “Sustainable design creates solutions that solve the economic, social and environmental challenges of the project simultaneously, and these solutions are powered by sustainable energies”. The main aim of sustainable architectural design is to find architectural solutions that support the well-being and existence of society, the environment and profitability. Sustainable architectural design not only attempts to reduce negative effects on humans and on the environment, but it also aims to create buildings that save costs in terms of energy and water, while providing at least the same ambient quality (Philip, 2009).

The American Society for Testing and Material describes Green buildings as “structures that are designed, constructed, renovated, operated, and reused in an environmentally and green-efficient manner. Green buildings, including green residences, exhibit a high level of environmental, economic, and engineering performance including: energy efficiency and conservation, indoor environmental quality, resource and material
efficiency, occupant health and productivity, transportation efficiency, improved environmental quality including air, water, land, limited resources and ecosystem”. In summary, sustainable design recommends using nonpolluting materials, having lower operating energy requirements and higher durability and recyclability. In sustainable design long-term value through modifiable building systems through life-cycle is preferred to least-cost investments and through timeless delight and craftsmanship (Loftnesse et al. 2005).

However, sustainable development has become an acceptable policy initiative and programmatic implementation strategy; having been the subject of much debates and controversy (Clark, 2010). Researchers criticized the concept of sustainability and modern architecture because of its high reliability on technology, and pointed out the need for making a new perspective and substantial contribution to architecture in order to create a truly sustainable environment. (Alexander, 2004; McDonough, 2005; Pontikis, 2010; Van der Ryn & Cowan, 1996). As Williams (2007) stated “technological solutions often cause problems greater than those they were intended to solve, requiring additional clean up, storage of toxic materials, and additional taxes to pay for such services”.

**Humane-Green Design**

Based on a survey by U.S. Green Building Council, many of its members believe sustainable building design will become a more common practice once the human benefits are identified, primarily the productivity gains believed to be associated with the provision of high quality interior environments (USGBC, 1999).
Limited studies have focused specifically on the subject of “Humane-green design”, however many findings confirm the existing problem in today’s sustainable architecture and design due to lacking an ecological view (McDonough, 2005; Sim Van der Ryn & Cowan, 1996; Stamatina & Panos, 2012;). Orr (1992) pointed out two different approaches of sustainability: “technological sustainability” and in contrast “ecological sustainability”. While technological sustainability believes that fundamental changes in that direction are unnecessary and there are always technological answers or market solution for a problem, the ecological sustainability assesses in finding alternative to the practices (Orr, 1993). Sim Van der Ryn & Cowan (2007) also stated the problem of today’s sustainability results from a lack of integration between natural worlds and humanly design world. Hence, they introduced Ecological design as the possible solution that refers to “any form of design that minimizes environmentally destructive impact by integrating itself with living processes” (Sim Van der Ryn & Cowan, 2007). In highlighting the existing debates around sustainable architecture, a study by Guy & Farmer (2006) identified six alternative logics of ecological design and explored how they can be used as alternative visions for technological strategies of sustainable places.

Alexander (2002a, 2002b, 2004, 2005) also developed a theory on “Humane design” to complete his previous theory of “Pattern Language”. Humane design aims to create good geometry and develop a dynamic and generative building process of buildings and neighborhoods. Alexander (2004) criticized the concept of sustainability in its contemporary meaning for being limited to technical aspect of design, and as a solution he introduced the term of “Morphogenesis”. Morphogenesis usually refers to things in the biological world, and it means everything in the world comes from
continuous adaptation of what existed there before. He believes in following the same process, as the biological world does, in order to create beauty, sustainability and life in buildings (Alexander, 2004).

Pontikis (2010) presented two primary models in sustainable building and design: “The first one is humane design which aims to create responsive and livable environment, where people can feel comfortable and have the feeling of ownership and belonging. The second one is green design which uses eco-friendly material and construction practices or safeguard air, water and earth. In order for a successful sustainable development to take place both models need to be integrated” (p.138). Therefore, the Humane-Green Design was introduced as “the integration of Humane design with Green design and aims in creating environments which sustain and regenerate nature while preserving and enhancing human health, spirituality, and well-being”. (Pontikis, 2010)


**Pattern language**

“The people can shape buildings for themselves, and have done it for centuries, by using languages which I call pattern languages. A pattern language gives each person who uses it, the power to create an infinite variety of new and unique buildings, just as his ordinary languages gives him the power to create an infinite variety of sentences” (Alexander, 1979, p. ix).
When Alexander (1979) first introduced the method of “Pattern Language” to the field of architecture and urban design, his primarily concern was “to bring an awareness of the use of towns and buildings to bear on the discipline” (Crabtree, 2002). As Alexander noted (1979), providing a common alive Pattern Language is the only way to create alive building and town. According to his studies in a pattern language, the language (likewise any other language) is used to link the patterns together, while each pattern describes “a problem that occurs over and over again in our environment and then describes the core of the solution to that problem” (Alexander et al., 1977). “Patterns summarize exposed design solutions that make people most comfortable in experiencing and using built form. Their relative value is that they were decided on a firm (in many cases scientifically valid) basis, rather than being just another opinion” (Salingaros et al., 2006, p. 33). Alexander also considered the need of both structural and human components together to provide a good Pattern Language, thus he also introduced the theoretical frame work of “the nature of order” which is connected with pattern theory (Alexander, 1999).

Alexander’s developed patterns and studies have been collected in two books and used in architecture and urban design for more than 20 years. Fundamentally, in book [1] “a Pattern Language”, over 250 patterns are described, examples are given, empirical data supporting the patterns are referenced, and the relationship to other patterns are defined. In book [2] “the Timeless Way of Building”, the way of using the patterns to design is described (Bayle et al, 1998).

Literature on pattern language and Alexander’s theories also supports the usefulness of providing pattern language as a fundamental in design; however the need of
new development and renewed application of pattern language also has been emphasized specifically in the field of architecture and design (Mehaffy, 2007). Some architects considered patterns as an incomplete method, because in some instances they were not successful in their combination (Salingaros et al, 2006).

Alexander originally used patterns in 1969 to design social housing in Peru (Alexander, 2005). Even though, pattern language originally known in architecture and urban design, patterns and pattern language are also used in many other fields; software design, management patterns, and organizational patterns (Rising, 1998). Alexander mentioned design patterns in architecture and computer science as a formal way of documenting a solution to a design problem in a particular field of expertise (Alexander, 1999). Many architects still continue to develop the applicability of pattern language in architecture (Salingaros et al, 2006).

**Restaurant Design**

Restaurants and casual eateries are often not only a place to eat; restaurants even serve their guests to conduct business or recreational meetings (Satler, 2003; Kopec, 2006). People are looking for an entertaining place associated with artistic and appealing qualities to enhance their overall dining experiences during their visit (Hamekar, 2000). Researches verify the vast influence of physical soundings and price perception on customer satisfactions (Dube, Johnson, & Renaghan , 1999; Knutson & Patton, 1995; Ryu, 2005; Varki & Colgate, 2001). The following section attempts to identify the most important ambient and physical factors in designing a restaurant setting.

Surveys have shown that the décor and artifacts (e.g., ceiling and wall decor, furniture, flooring, plants and flowers, paints and pictures, and etc.) rank the highest
prevalence of customer’s loyalty, followed by spatial layout (e.g., seating arrangement) and ambient conditions (e.g., background music, light, aroma, temperature) (Han & Ryn, 2009). Therefore, it has been suggested to assign expenses mainly for fascinating décor and artifacts of the physical dining environment (Han & Ryn, 2009). The support found in an environmental overall design style is able to define a specific behavior setting, and is influential on customers’ expectations and their actual behavior in a restaurant; (Kopec, 2006). As Kopec (2006) noted:

“An elegancy appointed restaurant (e.g., dark woods, subtle illumination and music, rich fabric, colors, table settings, and artwork) becomes a behavior setting in which customers expect a more sophisticated level of fare, and atmosphere than that of an eatery incorporating bright lights and colors, inexpensive place settings, and louder, faster-paced music” (p. 286).

Other factors associated with successful restaurant design include an appropriate selection of table sizes and combination. Generally, for a restaurant without the perfect mix of tables for different party sizes, having combinable tables has been suggested (Thompson, 2002). Although Thompson’s (2002) research findings confirmed combinability tables are preferable for the 50-seat restaurant or less, for the larger restaurant dedicated tables for different party sizes is more satisfying. Stimulation model of restaurant table mix also indicated the positive influence of optimal mix of tables on increased revenues (Thompson, 2003). Providing the sense of place by combining unique features, handmade or signature objects, nostalgic features, as well as providing opportunities to dine alone have been considered as satisfying elements for the restaurant customers (Satler, 2003).
Providing demanding privacy and control over the environment has long been known to be a significant factor for reducing individual’s stress. Giving the users altered seating choices as well as regulating their privacy, by using the architectural features will increase their level of control leading to decrease in their degree of stress level (Robson, 2008). Robson (2008) also reported “individuals are more likely to choose a table that offers more anchors and thus more visual screening in situations that are likely to produce stress, and that there is a difference in response between men and women as the degree of stress increases” (p. 376). A study on spending per minute in a different restaurant seating also found that booths generated the highest SPM (spending per minute) among all the other seating types and also are preferred more by customers (Kims & Robson, 2004). Furthermore, studies of interaction suggested that anchored tables and diagonal seating are greatly preferred. It has also been suggested to limit visual distraction by arranging tables at angles to each other for redirecting sight lines away from others tables (Baraban & Durocher, 2001, Kims & Robson, 2004). A study on consumers’ responses to table spacing in restaurants also indicated that tables space as tightly as 6 inches apart are not desirable for restaurants’ guests, while generously spaced tables are preferred more than common spacing of 12 inches (Robson, 2011).

Researches have also given attention to exterior environment of restaurants which aims to inform the customers about the restaurant, ambience and service. Well-defined entrances, convenient drop-offs and a sufficient waiting area are reported as the influential factors (Robson, 1999). Smith (2007) detailed the importance of color in relative to the build environment and users. He stated the influence of color in judging an unfamiliar café or restaurant, as well as the importance of understanding the culture of a
place in choosing colors. Researchers also found the positive correlation between incorporating warm colors into the restaurant’s décor and attracting customers. Warm colors make food seem more appetizing, and raise excitement, which causes over-stimulation leading to spending more (Robson, 1999). Colors and lighting are closely associated and colors need to be chosen in concordance with lighting (Baraban & Durocher, 2001). Soft incandescent lighting is mostly associated with a higher quality place, while bright fluorescent lighting is associated with a more casual and discount place (Baker et al. 1994).

The influences of other factors were also investigated in restaurant lighting. As Baraban & Durocher (2001) pointed out, applying sparkle would enhance and encourage conversation, and using indirect lighting which reflects from other surfaces instead of direct lighting help to increase environmental comfort.
CHAPTER III

METHODOLOGY

The primary aim of this project was to explore the importance of applying the Humane-Green principles and illustrate them through creating a Pattern Language for the restaurant setting. For reaching this goal a Persian restaurant located in Northridge, California was selected. This restaurant has been in business since the early 1980's and has a reputation as one of the best Persian restaurants in the area. Its original layout has remained unaltered since its opening. However, as business grew and food sales increased, the restaurant’s space became too small, unwelcoming and old. The store next to it was bought and added to the existing structure. Since the new structure needs to be designed, advantage was taken to practice and examine both Green and Human principles by creating a Pattern Language and applying them into the practical design process.

Figure 3.1. Location Map, (Google Map 2012)
General descriptions

Address: Roscoe Street, Northridge, CA 91324

ZONE: IVL/PIVL

Existing Restaurant Capacity: 60 persons

Existing Restaurant: 1,592.5 SQ.FT.

New Area to be Added: 1,592.5 SQ.FT.

Total Restaurant Indoor Area: 3,185 SQ.FT.

Exterior Dinning Area (Front Porch): 123 SQ.FT.

Exterior Dinning Area (Front Porch) to be Added: 123 SQ.FT.

Total Restaurant Outdoor Area: 246 SQ.FT.

Estimated budget to renovate: $60,000
Figure 3.4. Plot Plan, Restaurant location marked in red (Drawing not to scale)

Figure 3.5. Existing Floor Plan (Drawing not to scale)
Interviews and facilities observations

In order to reach the project’s goals, a series of interviews and discussion groups were held with the owner, workers and customers to ensure that the provided patterns meet their professional, cultural, and emotional needs. The interviews usually took place at the restaurant and the owner and the project contractor participated.

During the first unstructured interview with the owner and contractor after walking through the restaurant and taking pictures, some open-ended questions were asked in order to explore their needs and expectations.

1) What are the main problems in the existing restaurant?
2) What is the estimated budget for the restaurant’s renovation?
3) What are the main reasons for renovation?
4) What spaces need to be added or removed from the existing restaurant?
5) What types of customers usually come to this restaurant?

For the second interview, even though the interview was also an unstructured one and was not completely driven by prepared questions, efforts were made to find some responds to the following questions during the discussions. Two of the employees who have been working there for a number of years, as well as 10 customers who visit the restaurant regularly participated in this interview. These questions were also gradually asked from the people who I personally know go to the restaurant

1) What are the main problems in the existing restaurant?
2) What do you like and what don’t you like about this restaurant?
3) What part of the restaurant needs to be improved?
4) When and why do you usually come to this restaurant?
5) How would you describe some of the following features in this restaurant? for instance: Décor, ambiance, lighting, color, and material

The third interview was more specifically focused on sustainability and sustainable practices. A basic list about the possible sustainable practices in a restaurant environment was provided and discussed with the owner.

In addition to these interviews, the function, interaction, and the use of space by either workers or customers was observed for few days, also taking into consideration whether or not there were sustainable elements of the space. Eventually, based on the findings from the observation and interviews (see Chapter IV: Results), draft guidelines or checklist was prepared to assess applying both the Humane design and Green design principals in the restaurant setting.

**Guideline assessment in term of Humane-Green design**

The guideline has been divided into two major parts: Humane design and Green design. Next, each part was divided into categories and subcategories. Some general questions might be answered during the research to clarify each category and subcategories. Eventually, these created guidelines were utilized as a fundamental structure to write the restaurant setting pattern languages.

The following guideline was made:

**Part I. Humane Design**

a) *Living spaces*

1) Layout
   - Functionality/ do spaces support needed functions and activities?
   - Community and privacy/ do spaces have the right degree of community and privacy?
2) Circulation
   - Are the entrances and exits welcoming?
   - Does circulation provide opportunities for social contact?
   - Wayfinding/ can people comfortably find their way around the building?
3) Social spaces
   - Are there indoor and outdoor spaces which bring people together to socialize, work, eat and play?
4) Personalization of space
   - Do spaces provide the freedom for people to personalize and adjust them to their needs?

b) Natural light
   1) Daylight
      - Is there enough daylight in spaces?
   2) Connection to outdoors
      - Do doors and windows provide views and connection to visually pleasing outdoor spaces?
   3) Window treatment
      - Are there nice window treatments to soften the light and provide the right degree of privacy and protection from the sun?
   4) Window elements
      - Are there window elements such as window seats, wide windowsills and trims, etc?

c) Color
   1) Harmonious color
      - Are there harmonious and pleasing colors outside and inside the building?
   2) Colors of cultural affinity
      - Do colors support and promote the culture of place and community?
   3) Colors in personal space

d) Furniture
   1) Comfortable and ergonomic furniture
   2) Built in furniture

e) Landscape
   1) Indoor landscaping
- Green walls
- Water fountain
- Plants in planters
- Plants and flowers in pots

2) Outdoor landscaping
   - Native landscaping

Part II. Green Design

a) Energy conservation
b) Water conservation
c) Material conservation
d) Waste management
e) Landscape

Developing the Pattern Language

The restaurant Pattern Language was formed based on Christopher Alexander’s pattern theory. According to Alexander’s Pattern Language (1979), in each category, related patterns have been written based upon the problems which occur over and over again in designing a building, and next suggested solutions for the addressed problems have been described. The first step of creating patterns for this project was finding related patterns to dinning environment in the “Pattern Language” book by Alexander. The following patterns were identified from the book:

Each identified patterns was added to the related category or sub-category in the guidelines list. The next step was creating my own restaurant patterns following the Alexander’s format and more particularly based on my studies of the selected restaurant. Minor modifications were done to the Alexanders’ pattern format to make it more focused on restaurant settings. First, for each pattern a memorable title has been defined in order to present the pattern in the best way. Next, an inspirational image has been selected which shown an archetypal example of that pattern. In each sub-category, the problems which might occur were identified based on either reviewing the literature on restaurant environment or my own studies (observations, interviews) of the selected restaurant. Each problem has been described and for clarity, the discussed problems have been illustrated through explanation of that issue in the existing restaurant. For each described problem, practical design solutions have been proposed based on reviewed literatures. After the solution, there is a floor plan, sketch or rendering image of the proposed design which shows the application of solution in the selected restaurant. The following tables list patterns under each category:
## Living Spaces

1. **Layout**
   - 1.1. Table combination
   - 1.2. Diversity of seating
   - 1.3. Degree of privacy

2. **Circulation**
   - 2.1. Visible from the distance
   - 2.2. Business signs
   - 2.3. Easily accessible spaces

3. **Social Spaces**
   - 3.1. Waiting area
   - 3.2. Eye contact

4. **Personalization of space**
   - 4.1. Sense of Nostalgia

## Lighting

1. **Daylight**
   - 1.1. Lighting theme

2. **Connection to outdoors**
   - 2.1. Pleasing outdoor

3. **Window treatment**
   - 3.1. Decorative shade

4. **Window element**
   - 4.1. Elegant window

---

| a) Energy efficiency | 1) Lighting | 1.1. CFL light bulbs or LED lights  
|                      |            | 1.2. Lighting sensors  
| b) Water efficiency | 1) Restroom | 1.1. Low-flow toilet  
|                      | 2) Kitchen  | 2.1. Low-flow pre-rinse spray  
| c) Environment and air quality | 1) Interior design | 1.1. Green material  
| d) Waste management |                    | 1.1. Recycle waste  
| e) Landscape |                    | 1.1. Native plants  

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Table 3.1. Created Restaurant’s Humane Patterns

Table 3.2. Created Restaurant’s Green Patterns
Post-Design Evaluation

Evaluation by Experts

Once the pattern language was created and finalized, it needs to be reviewed and evaluated by two selected experts. The experts have been proposed by the major advisor, and the main criteria for choosing them were their knowledge about both design and Pattern Language theory. An introduction letter, the developed Pattern Language, and a questionnaire were emailed to the experts. Both experts replied via email after a week. For confidentiality, the experts were randomly numbered and referred to as Expert Reviewer. (See Appendix A for introduction letter and Questionnaire)

Experts’ Characteristics

Expert Reviewer # 1 is a noted architect and author. She is currently practicing in Seattle and is an adjunct professor of architecture at a notable university in Portland. She is a founding member of a notable architectural organization. She studied and worked for a number of years with Christopher Alexander.

Expert Reviewer # 2 is an interior designer and co-founder of a successful Interior Design, Inc. She previously studied and researched on Christopher Alexander’s theories, especially on Generative Design and Pattern Language theory.
CHAPTER IV

RESULTS

Chapter 4 of this graduate project focuses on demonstrating the Pattern Language and revised Pattern Structure specifically adapted to the restaurant environment.

The first phase of this chapter discussed the responds to the unstructured interviews from the owner, contractor, costumers and staff. The next phase details the reinterpreted and revised pattern structure formatted and outlined in previous chapter (Chapter 3 – Methodology). The patterns in each category were developed based on the identified problems and suggested solutions. To clarify how the patterns might be applied in a design project, the problems have been explained through discussing the problem within the selected restaurant, and then the recommendations have been illustrated by means of sketches, renderings and floor plans.

The next part of the chapter demonstrates completed design proposal that includes schematic design floor plans, sections, and renderings of dining area. (See Figure 4.51-Figure 4.60)

The last part of this chapter focuses on replies from Expert Reviewer #1 and Expert Reviewer #2. Included are their replies, comments and critiques to the questions (outlined in Chapter 3 – Methodology) regarding the developed Pattern Language and this graduate project in general.

Discussion of the Owner, and Contractor Interviews

In examining the interview feedback from the owner, there were several issues that gave importance and guidance to the design development of the selected restaurant.
The owner discussed the customers’ type and their expectations which helped to better understand the function of the space. For instance, he explained that restaurant visitors are mostly family members and they are looking for a place to get together. He also mentioned that they might lose some costumers if they provide bar area or serve alcoholic drink in the restaurant. The owner also discussed the importance of using durable materials, especially considering harder surface in the parts which the table or chair might damage the wall. He also pointed out the convenience of having his own office in the restaurant. The contractor also mentioned some ADA requirement for the restrooms, kitchen and dining area.

Discussion of the Customers, and Staff Interviews

In summary of responds to the unstructured interviews administrated with the customers, it emerged that customer satisfaction level is overall negative towards atmosphere, location, and accessibility of spaces. The main concerns of the customers were to find the restaurant especially for the first time since it’s located behind some old buildings and there is a vast parking lot in front of it. As one of the customers mentioned, “One of the best restaurants in the valley in a most unassuming location”. It’s been stated there is no special decoration in this restaurant aside from some frames hanging on the walls. The overall restaurant layout was considered poor mostly because the restroom is located all the way in the back and is not accessible. As one of the customers pointed out, “it is not a comfortable customer friendly restroom”. There have also been complaints about the uncomfortable chairs, and the small table size for their large food portions.

Interview with the two employees of the restaurant verified the need of enlarging the existing restaurant, since it gets too crowded especially on the weekends. They also
mentioned the necessity of providing additional restrooms for the customers. One of the employees mentioned the importance of having more Persian style decoration for the restaurant, and also to provide TV in order to entertain customers.

All of the information given by the owner, contractor, employees and customers were considered and used to develop the design proposal and pattern language for the restaurant selected in this project.

*Humane and Green Patterns*

*Table of contents*

**Part I. Humane Patterns**

*a) Living spaces*

1) **Layout**

   1.1. Table combination
   1.2. Diversity of seating
   1.3. Degree of Privacy

2) **Circulation**

   2.1. Visible from the distance
   2.2. Business Signs
   2.3. Easily accessible spaces

3) **Social spaces**

   3.1. Waiting area
   3.2. Eye contact

4) **Personalization of space**

   4.1. Sense of Nostalgia

*b) Lighting*

1) **Daylight**

   1.1. Lighting theme

2) **Connection to outdoors**

   2.1. Pleasing outdoor

3) **Window treatment**
3.1. Decorative shades

4) Window elements

4.1. Elegant Windows

c) Color

1) Harmonious color
   1.1. Contrast and harmonious
   1.2. Add color by using flowers
   1.3. Color in dining area

2) Color of cultural affinity
   2.1. Meaning of color in Persian culture

d) Furniture

1) Comfortable and ergonomic furniture
   1.1. Appropriate table sizes
   1.2. Different furniture choices
   1.3. Comfortable table spacing

Part II. Green Patterns

a) Energy efficiency

1) Lighting
   1.1. CFL light bulbs or LED lights
   1.2. Lighting sensors

2) Equipment
   2.1. Energy star Equipment
   2.2. Refrigerator
   2.3. Heating and cooling

b) Water efficiency

1) Restroom
   1.1. Low flow toilet

2) Kitchen
   2.1. Low-flow pre-rinse spray

c) Environment and air quality

1) Interior design and construction
   1.1. Green Material

d) Waste management

1.1. Recycle waste

e) Landscape

1.1. Native plants
Part I. Humane Patterns

a) Living spaces

1) Layout

1.1. Table combination

Figure 4.1. Table combination example in Pio-Pio restaurant

Having the right combination of sizes of tables in a restaurant can decrease wait time for customers, maximizing seating capacity and profit (Thompson, 2003).

- Problem in the selected restaurant: the restaurant has both large group parties (family members), and individual customers. Thus, it’s important to find the best table selection to optimize the capacity.

Therefore:

- Use small combinable tables (two- or four-person) in the restaurant to accommodate parties of various sizes.
• Avoid using large dedicated tables (eight-person or larger) in the restaurant to maximize space and seating capacity.

• Be aware that combinable tables may cause seating loss when tables are combined that seat more people than actual customers (e.g. two 4-person tables combined to seat only six customers) (Thompson, 2003).

Figure 4.2. Suggested table combination for the selected restaurant (Drawing not to scale)
1.2. Diversity of seating

Providing the users with the choice of seating will increase their level of control over the environment and as a result decrease their stress’ level (Robson, 2008). People also have a tendency to choose different locations. It depends on their meeting types and their gender (Robson, 2008).

- **Problem in the selected restaurant:** The restaurant tables are lined up in rows, and basically there is only one seating option available for the costumers: seating on the 4-person tables, and next to each other.

  *Therefore:*

  - It’s preferred to give everyone a choice of location by providing a diversity of seating.
  - The combination of banquette, booths and regular seating in different sizes can be helpful.
Figure 4.4. Suggested seating options for the selected restaurant (Drawing not to Scale)
1.3. Degree of Privacy

For settings that are occupied for a short time, such as a seat in a restaurant or bar, individuals and groups often choose architectural features such as walls of columns to help define their personal territory and regulate privacy (Kimson, Robson, 2004).

- **Problem in the selected restaurant:** In this restaurant people come with different tastes and purposes; while a couple may come to have a relaxing romantic dinner, a group of people might hold a party. So it’s important to respect their need of privacy by providing more personal spaces.

  *Therefore:*

- Booths seating (tables with permanently fixed seating and solid structure divider on three sides of the table) is suggested to provide more personal space. Booths also are preferred by most costumers and generated the highest SPM (spending per minutes) of all table types (Kimson, Robson, 2004).
• A series of stepped walls to help to break up the space but also act as enclosure for seating’s. Large potted plants are becoming increasingly popular both as decoration and as a screen to divide a room into smaller, intimate areas. They also absorb sound to quiet a noisy room.

• Using more anchors and thus more visual screening between the tables.

Figure 4.6. Suggested screens to add privacy and breaking up the dining area

Figure 4.7. Degree of privacy in suggested floor plan for the selected Restaurant (Drawing not to scale)
2) **Circulation**

2.1. Visible from the distance

![Distance visible restaurant Example](image)

Figure 4.8. Distance visible restaurant Example

The function of the exterior design is to attract customers and invite them in to eat. The design should stimulate the imagination and heighten the curiosity of the clientele group.

- **Problem in the selected restaurant:** Even though, the selected restaurant is well-known and it is located just at the junction of Tampa and Roscoe Ave, it is hard to find.

  As some customers mentioned:

  You might not see this place because it is hidden behind a large flower shop.

  This location is a bit hard to find only because it sits behind some old fairly tall building.

  *Therefore:*

  - Put effort in making the outdoor area more interesting and visible, in order to make it stands out from the buildings around it.
  - Changing the fences and adding some flowers and vegetation might be effective.
  - Design an elegant window frame to create a more dramatic entrance.
2.2. Business Signs

Figure 4.9. Business Sign Example

In every business, their signage and the way their business were presented have impact on the customers’ choices. The signs are the first impression of the customers, even before entering to the place.

- Problem in the selected restaurant: In restaurants such as the subjected restaurant which are not perfectly visible from the street, the signage is the first element that attracts the customers and helps them find their way toward the restaurant.

Therefore:

- Designing a sign which is attractive and visible from distance helps people find their way to the restaurant.

- Attention can be drawn to a sign by varying the size, shape, color, construction material, height, lighting, or style of printing.
2.3. Easily accessible spaces

Figure 4.10. Concept sketch for restaurant circulation by George Wade

In every place, how different spaces connect to each other defines the main circulation. In a restaurant even though it seems the main spaces are limited to kitchen and dining area, there are some other spaces involved that will affect the flow and block the circulation. Where the restrooms are located and how the kitchen is connected to the dining area play important role in a restaurant design/layout.

- **Problem in the selected restaurant**: in the existing restaurant the restroom is located far from the dining area, and exactly next to the kitchen. Customers need to pass the kitchen and are able to see the entire kitchen while they are finding their way toward the restrooms. The waiters and customers might hit each other while walking toward the dining area.

Therefore:

- Design various spaces in the ways not to interfere in other’s activities.
- Sub-spaces like restroom need to be accessible easily.
- Try to keep the main circulation clear, and don’t block it with furniture or other spaces
Figure 4.11. Suggested circulation for the selected restaurant
(Drawing not to Scale)
3) Social spaces

3.1. Waiting area

First impressions are definitely important. This is particularly true when customers enter a restaurant. So be sure that there is adequate space available in the area where customers wait to be seated. While the customer waiting area does not produce direct income, this space can allow customers to wait in comfortable surroundings.

- **Problem in the selected restaurant**: restaurant is offering taking out food as well as dining in, it also has some customers who are coming to this place just to hang out and might have a drink or tea. There are also some customers needed to wait to be seated or to arranging the tables.

**Therefore:**

- Allocating a separate area for taking out or waiting customers can be helpful and provide them the opportunity to socialize.
Figure 4.13. Suggested waiting area for the selected restaurant (Drawing not to Scale)
3.2. Eye contact

Figure 4.14. Possible socialization in a restaurant

When a group of people or a couple comes to a restaurant, they usually want to socialize within their own group. They want to be able to see every member of the group directly, and to have eye contact with each other.

Therefore:

- Studies of interaction suggest that anchored tables and diagonal seating are greatly preferred (Mehrabian, Diamond, 1971)

- Tables that position users in a face-to-face configuration may lead to a longer stay and a larger average check than tables that place guests side by side (Kimson, Robson, 2004).

- U-shaped booths are more preferable than line up banquetttes, since more people would be able to see each other.

Figure 4.15. Suggested seating to provide more eye contact opportunity within a tables’ guest (Drawing not to Scale)
4) Personalization of space

4.1. Sense of Nostalgic

Figure 4.16. Sense of nostalgic example in a restaurant

The walls and what put on them are often ignored by the restaurant operator. But a little thought and imagination in the treatment of the dining room walls can greatly enhance the atmosphere.

- Problem in the selected restaurant: most of the customers are not satisfied with restaurant overall ambience. As they mentioned: The place didn't look all that nice and could've been cleaner or the decor is none existent asides from some frames hanging on the walls. This place is the complete opposite in terms of decor to its sister location on Westwood Blvd. I felt like I was having dinner in my poor grandmother's dining room.

Therefore:

- Make effort to provide the feeling of being in a place that is special.
- Incorporating unique features, handmade or signature objects, nostalgic features. (Kopec, 2006)
• Finding an appropriate theme for the restaurant. (preferably Persian in this case)

Figure 4.17. Incorporating Persian artwork

Figure 4.18. Incorporating Persian textures

Figure 4.19. Incorporating Persian architectural elements
b) Natural light

1) Daylight

1.1. Lighting Theme

The type of client patronizing a restaurant has a very important bearing on the intensity of lighting needed. Low levels of lighting are generally associated with higher prices and high quality service.

Since the subjected restaurant is more a casual dining area

Therefore:

- Lighting which emphasize the colors yellow, orange, red, and red-purple are recommended, because they produce a warm atmosphere.

- The red flame also is suggested, because it enhances and flatters people's appearances, and makes most foods appear more appetizing.
2) Connection to outdoors

2.1. Pleasing Outdoor

Figure 4.22. The outdoor patio at restaurant O by Denton

Problem in the selected restaurant: The selected restaurant provided a small outdoor area, but since its part of parking spaces, there is not much to see and enjoy. It’s not really pleasant to sit outside and watch the cars.

Therefore:

• It’s suggested to make outdoor area separated from the parking spot by some interesting features.

• Designing an elegant fence to provide an edge. Using flowers or plants can be effective.

Figure 4.23. Suggested outdoor seating for the selected restaurant
3) Window treatment

3.1. Decorative shades

Many restaurants today use decorative shades and blinds to control light and reinforce their atmosphere. Therefore:

- Apply modern blinds and window shades made in aluminum, wood, plastic, and cloth. They come in solids, prints, and decorative scenes. The color, style, and material of curtains and blinds must enhance the atmosphere, but not draw undue attention.
4) Window elements

4.1. Elegant Windows

Figure 4.25. Exterior windows example

- Problem in the selected restaurant: Since the location of the selected restaurant is a bit hard to find because it is located behind some fairly tall building. A good window design gives us the ability to keep the costumer’s attention away from the non-appropriate environment of the outside.

Therefore:

- Keep costumer’s attention to inside environment by blocking their view by interesting window element. Adding curtains might be helpful.

- Changing the fences and adding some flowers and plants.

- Design an elegant window frame to create a more dramatic entrance.

Figure 4.26. Suggested exterior view of selected restaurant
c) Color

1) Harmonious color

1.1. Contrast and harmony

![Contrast and harmony example in Vila Giannina Restaurant](image1)

Figure 4.27. Contrast and harmony example in Vila Giannina Restaurant

By contrasting or minimizing the values of objects and backgrounds, certain architectural and furniture details can be emphasized or reduced.

*Therefore:*

- If there are structural elements that are necessary but visually unattractive, such as plumbing pipes, paint them to match the wall and they will virtually disappear.
- If important furniture display pieces exist, let them contrast with their backgrounds for greater importance.

![Proposed Contrast and harmonious degree for the selected restaurant](image2)

Figure 4.28. Proposed Contrast and harmonious degree for the selected restaurant
1.2. Add colors by flowers

Figure 4.29. Example of applying flowers in a restaurant

Flowers and plants are used as decoration in restaurants. Flowers are able to add color and variation to the spaces.

Therefore:

- Fresh-cut flower arrangements can be placed on tables as decoration.
- Large potted plants are becoming increasingly popular both as decoration and as a screen to divide a room into smaller, intimate areas. They also absorb sound to quiet a noisy room.

Figure 4.30. Suggested flowers application within selected restaurant
1.3. Colors in dining area

![Image of a dining area with vibrant colors]

Figure 4.31. Example of color application in a dining area

The color choice can be changed in regard to the restaurant style, type of lighting and with attention to the color of surroundings, but there are still some common points for selecting colors in a dining area. While some colors will make the place boring and have a negative effect on guests other colors stimulate appetites.

- **Problem in the selected restaurant:** in this restaurant the only applied color is white and light brown so it made the overall atmosphere boring for the guests. Moreover, using the color of white is not recommended for the dining room.

  Therefore:

  - Applying colors that tend to stimulate appetites is recommended. These colors are: raspberry, yellow-green, peach, and brown.
- Changing the color of white walls in dining areas, because white walls are psychologically negative and uninviting.

- Adding colored walls to the dining area because colored wall stimulate food sales, while a single solid color in a room is monotonous and boring.

Figure 4.32. Suggested color themes within selected restaurant
2) Colors of cultural affinity

2.1. Meaning of colors in Persian culture

Figure 4.33. Use of color example in Persian culture

Certain Colors are often associated with certain historical period, special buildings, place information and architectural experience.

- Problem in the selected restaurant: The selected restaurant as a Persian restaurant needs to follow Persian cultural theme and colors,

Therefore:

Understanding the meaning of colors in Persian culture can be helpful in choosing appropriate colors. According to (http://eshgheman.livejournal.com):
“Red - heat, energy, life" Persian red is a deep reddish orange earth or pigment from the Persian Gulf composed of a silicate of iron and alumina, with magnesia

Green - vitality, regeneration, gardens, heaven, sanctity the color Persian green is named from the green color of some Persian pottery and is a representation of the color of the mineral malachite.

Yellow - sickness, paleness In Chahar-Shanbeh Soori, Festival of Fire the people make a fire and jump it saying: "Sorkhie to az man, Zardieh man az to", literally means your redness (health) is mine, my yellow (paleness) is yours.

Blue - heaven, spirituality The color Persian blue is named from the blue color of some Persian pottery and the color of tiles used in and on mosques and palaces in Iran. Persian blue comes in three major tones: Persian blue — a bright medium blue; medium Persian blue - a medium slightly grayish blue and Persian indigo - a kind of dark blue.

Orange - Persian orange is a color used in pottery and Persian carpets in Iran.

White - purity Bride in Persian is called arous, which means white

Black – death”
d) Furniture

1) Comfortable and ergonomic furniture

1.1. Appropriate table sizes

![Figure 4.34. Table setting example](image1)

- **Problem in the selected restaurant**: the selected restaurant typically serves large portion of food, thus based on the some customer’s feedbacks: the tables are a bit small for the amount of plates you get.

  Therefore:

  - The size of 36”x36” Rectangular shape table for four-person tables, and the size of 24”x36” for two-person tables have been recommended to increase the customer’s satisfaction.

![Figure 4.35. Suggested table setting and size](image2)
1.2. Different furniture choices

Figure 4.36. Variety of furniture style in a restaurant

A person comes to restaurant to be part of a different dining environment as well as enjoying the food. So providing variety of furniture styles, give them opportunity to experience different dining situations in one place.

Therefore:

- The combination of banquette, booths and regular seating in different sizes is helpful.
- Consider sofa or more lounge style furniture for the waiting area instead of placing the regular dining chair and tables.

Figure 4.37. Suggested furniture options for the selected restaurant (Drawings not to Scale)
1.3. Comfortable table distances and seat heights

The type of restaurant will help determine distances and spaces between tables, chairs, and diners, but there are some general observations and "rules" that should be remembered. It’s important because diners may be less likely to return to a restaurant with uncomfortable table spacing.

*Therefore:*

- The most comfortable height for chair seats is 17 to 18 inches off the floor. Seat backs should extend to 34" for adequate back support.

- A seat depth of 16" is comfortable to most people. Chairs with arms add to customers' comfort and are more luxurious.

- The preferred table top height is 29 to 30 inches, and the preferable width across a table is 2'6". Square 2'6" tables are appropriate for two to four persons. A two foot square table will accommodate two persons (Thomas, 1981).
Potential restaurant guests feel strongly negative toward tables spaced as tightly as 6 inches apart, and that even the more common spacing of 12 inches is considerably less desirable than generously spaced tables. (Robson, 2011)

Figure 4.39. Suggested table distance and seat height
Part II. Green Patterns

a) Energy efficiency

1) Lighting

1.1. CFL light bulbs or LED lights

Figure 4.40. CFL and LED lights

“Lighting represents approximately 11% of a restaurant's energy bill and 40% of energy usage in commercial buildings. Incandescent lights use a lot of energy and expel most of the energy as heat which comprises the A/C system” (Sustainable Foodservice Consulting, 2011).

Therefore:

• Install high-efficiency fluorescents in kitchen and storage areas. T-8 fluorescent fixtures with electronic ballasts use 20% less energy than standard fluorescents.

• Install lower-wattage bulbs. Substitute compact fluorescents (CFL’s) for incandescent bulbs wherever possible. These use less than 25% of the energy for equivalent brightness, last four times longer and are particularly valuable for light fixtures which operate 24 hours per day. They might be used in dining and bar areas as well as hallways, storage rooms and outdoor lighting (Green sheets, 2006).
1.2. Lighting sensors

Lighting is an important design element of any restaurant. But there are still opportunities to reduce lighting energy use besides changing the lamp and without leaving your customers in the dark.

_Therefore:_

- Put electronically commutated motors, or ECMs, on the walk-in.
- Use photo sensors on exterior lighting and motion sensors on storeroom and walk-in light.
2) Equipment

2.1. Energy star Equipment

Figure 4.42. Energy star equipment Logo

The largest percentage of a restaurant's energy bill is for food preparation, which is about 30%, with refrigeration costs running somewhere around 13-18% (Sustainable Foodservice Consulting, 2011).

Therefore:

- Equipment and lights should only be on when they’re actually in use. And since most equipment pre-heats quickly, in 10 minutes or less, there’s no reason for staff to turn everything on the minute they walk in the door in the morning. (Food Service Equipment Report, 2010)

- Purchase and Install ENERGY STAR qualified or Consortium for Energy Efficiency (CEE) rated appliances.
2.2. Refrigerator

Refrigerators and ice machines run 24/7, so small improvements in efficiency make big differences in energy use. Waste heat from refrigeration and HVAC systems is being diverted to preheat a store’s hot water supply, because no maintenance restaurant refrigerator letting cool air out and warm air in.

Therefore:

- Maintain door gaskets on walk-in or reach-in refrigeration units to prevent letting cool air out and warm air in, and to maximize the efficiency of the unit.
2.3. Heating and cooling

Foodservice operations use a variety of equipment for heating and cooling building spaces. “Space heating and air conditioning make up about 25% of a restaurant's energy bill; the largest energy cost next to cooking” (Sustainable Foodservice Consulting, 2011).

Therefore:

- maintenance on HVAC systems to occur only when the units are not working properly
- Don’t overcool or overheat: If your customers are wearing sweaters in the summer and taking them off in the winter, the thermostat is set too low or too high.
- Try to zone heat and cool the kitchen area separately.
- Turn thermostats up (summer) or down (winter) when you’re not open. Each one-degree adjustment to your thermostat saves up to 5% on your heating and cooling bill.
b) Water efficiency

1) Restroom

1.1. Low flow toilet

Figure 4.45. Low flow toilet

Toilets are one of the main sources of water use in restaurants. A restaurant may use 3,000 gallons on a slow day and 7,000 gallons on a busy day (Dwyer Energy, 2010).

Therefore:

- Water-efficient models, including low-flow toilets, dual-flush toilets, and waterless or low-flow urinals, can reduce the water usage and save money. Standard toilets can be made more water-efficient by adjusting flush valves or retrofitting your current toilets with water dams or diaphragms (Florida Medical Association, 2012).
2) Kitchen

2.1. Low-flow pre-rinse spray

Figure 4.46. Low-flow pre-rinse spray

About half of the water used in restaurants is used in the kitchen areas. Installing a low-flow pre-rinse valve, for example, costs about $60 or so and can save you as much as $1,000 a year in hot water (Building a Green Sustainable Restaurant, 2010).

Therefore:

- Install low-flow pre-rinse spray valves in your dishwashers. These internal devices can make a big difference in overall water usage by making the machine run more efficiently.
c) Environment and air quality

1) Interior design and construction

1.1. Green material

Building itself might be a big source of energy uses. By considering some little options especially at the time of remodeling can reduce the energy consumption and increase overall air quality in a building.

Therefore:

- Utilize floor and wall tiles and carpeting that contain recycled or reclaimed materials.
- Use renewable resources such as sustainably-harvested woods, bamboo, natural linoleum flooring and counters, and wallboard made from wheat straw instead of using hardwood flooring, granite and marble, vinyl and gypsum (Going greener guide, 2010).
- Use Low VOC Paints and Adhesives: Many paints contain volatile organic compounds (VOC’s) which “off-gas” and causing respiratory problems. Thus applying low or zero-VOC versions eliminate these problems without impacting performance (Green America, 2003).
- Regionally-Sourced: Try to use building materials and furniture which are manufactured within your area, reducing energy costs of transporting them across the country or beyond.
d) Waste management

1.1. Recycle waste

“Most foodservice operation throw out a massive amount of garbage, most of which could be diverted. 75% of material in today’s landfill is recyclable or compostable, while 50-70% of the weight of a foodservice operation's garbage consists of compostable food items. Food packaging makes up most of the remaining weight of the garbage's bins, but account for around 70% of the volume of foodservice trash. A foodservice operation without recycling, composting or any waste reduction program can reduce their disposal cost by at least half by implementing simple, structured practices” (Sustainable Foodservice Consulting, 2011, Para 1).

Therefore:

- Recycle waste when possible. It significantly reduces the amount of raw materials, energy and water generated from the production of new products, and both staff and guests can contribute to the effort.
1.1. Native plants

Create a landscaping policy and maintenance plan that minimizes the use of water, chemical fertilizers, pesticides and herbicides by using plants that naturally occur in your area.

*Therefore:*

- Use native plants and flower to decorate or outdoor area of restaurant.
**Design proposal**

Based on all of the researches, the major clusters of the new Pattern Language were identified and patterns were developed and design was executed. The following presents process of the design, proposed floor plan layout, sections, and some 3D renderings of the selected restaurant.

Figure 4.50. Design Process
Figure 4.51. Suggested Floor Plan (Drawing not to Scale)

Figure 4.52. Section A (Drawing not to Scale)

Figure 4.53. Section B (Drawing not to Scale)

Figure 4.54. Section C (Drawing not to Scale)
Figure 4.55. Dining area Rendering

Figure 4.56. Dining area Rendering

Figure 4.57. Dining Area Rendering
Figure 4.58. Dining area Rendering

Figure 4.59. Dining area Rendering

Figure 4.60. Dining area Rendering
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.

Replies of the Expert Reviewers:

1) Is the pattern language easy to understand?

Please rate from 1 to 10 scale with 1 being “extremely difficult to understand” and 10 being “extremely easy to understand”

Reply of Expert Reviewer #1: 7 – It would help to make the category headings and subheadings and pattern titles all more different so that it is easier to tell them apart. For example increasing the text size, using bold type, or ALL CAPS as ways to differentiate. Or even better, start each pattern with a new page so that the formatting is very clear and consistent, and the patterns all look similar (the book A Pattern Language does this, and it makes the individual patterns easier to find). The larger categories could also have their own pages as well.

Reply of Expert #2: 9 – The pattern language was easy to understand and follow. The essential concepts and unfolding process were explained in project specific format for the Persian Restaurant in Northridge.

2) How useful will the pattern language be to someone who is designing a restaurant context?

Please rate from 1 to 10 scale with 1 being “not useful” and 10 being “very useful”
Reply of Expert #1: 7 – Very good and practical information that covers a lot of elements at many levels of scale.

Reply of Expert #2: 9 – The pattern language provided a basic approach and guidelines for a restaurant design which I think will be useful for future applications by designers, architects, contractors, and/or restaurant owners. However, it might be a bit confusing to understand this approach for a person who is not familiar with patterns and pattern language in general. I would suggest explaining the structure of the pattern. This way, when applying the restaurant pattern language, an individual can add his/her own pattern(s) and alter the existing patterns specifically for their project.

3) Is the pattern easy to follow?

Please rate from 1 to 10 scale with 1 being “not easy to follow” and 10 being “easy to follow”

Reply of Expert #1: 8 – yes, fairly easy to follow.

Reply of Expert Reviewer #2: 10 – For a person who has knowledge, understanding, and had previously worked with the pattern language, the pattern structure was easy to follow. As I’ve mentioned before, I would suggest adding the pattern structure/format (title, inspirational image, problem, solution/therefore, sketch, etc.)

4) Can this pattern language provide a helpful guide to a more holistic sustainable approach?
Reply of Expert Reviewer #1: Perhaps.

Reply of Expert Reviewer #2: Yes. Especially since the pattern language so carefully focuses on sustainability, green design, energy efficiency, and their applications into design of an everyday environment.

5) Are there ways the provided pattern language can be improved?

Reply of Expert Reviewer #1: Yes, here are a few comments:

I thought that you did a better job stating the “problem” with the Green Patterns than with the Holistic Patterns. It seemed like the Holistic Patterns generally started with the solution rather than stating a problem. I do like most of what you say with the Holistic Patterns, so it might be as easy as just adding or modifying a sentence for each pattern. Here is an example of what I mean: Pattern 1.1 Table Combination reads “Having the right combination of sizes of tables in a restaurant can decrease wait time for customers, maximizing seating capacity and profit (Thompson, 2003)”. This isn’t really stated as a problem, rather it sounds like a solution. To modify it, you could say: “Poorly thought out table configurations can cost a restaurant much in customer satisfaction and overall profitability. Then continue with your original sentence.

Another comment is regarding the pattern titles. Some of them are good in that they evoke a feeling or are descriptive in some way (for example “Comfortable Table Distances and Seat Heights” or “Elegant Windows”). But others are a bit pedestrian and do not help me conjure up an image in my mind (for example “Waiting Area”). Each pattern title should be something a little bit poetic or descriptive (for example
“Waiting Area” could be “Warm and Inviting Waiting Area” or “Eye Contact” could be “Eye Contact for Human Connection” or even “Sparkling Eyes Everywhere”!

One last comment is that it would be good to cross reference patterns with one another, and possibly weight them in terms of importance. See A Pattern Language as one model for how this is done (they use 0, 1, 2, or 3 asterisks after the pattern title to designate the importance of the pattern, and list linking patterns at the beginning and end.)

Reply of Expert Reviewer #2: I believe that there is always room for improvement; especially with new technological and sustainable approaches. I think you did a great job in demonstrating the pattern solutions for each pattern problem. If this pattern language will be provided to the client/owner of the restaurant, I would suggest adding specific information; such as where the goods and services could be found in the area: a local lighting store, a paint company where low VOCs paint can be found, and so on. However that might create a bit of a pattern-specification sheet hybrid and might be a subject for a whole new thesis project.

6) Can applying this pattern enhance the overall dining experience?

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

Reply of Expert Reviewer #2: Yes. Since the patterns were primarily based on the concerns of the owner, contractor, clientele, literature review, and the designer, this would definitely improve the overall dining experience. Concerns (traffic flow, energy costs, green and sustainable design elements), requirements (ADA and such), and even
taste (Persian theme, table size, etc.) were reflected in interviews and patterns. Since each of the above was addressed and solutions were provided, it is now up to the owner and contractor/builder to bring these solutions to life in order to enhance the overall dining experience. It would be interesting to see this project completed and post occupancy evaluation to occur. Furthermore, seeing this pattern language applied to other restaurants design would also help to see how the pattern language enhances the overall dining experience.

7) Please note any other comments or suggestions in the space below.

Reply of Expert Reviewer #1: In general I think the pattern language and solutions are strong. There is good variety in terms of levels of scale, and many of the patterns have cited research as part of them which is excellent to see. I would like to see more citations, though – for example the pattern “Recycle Waste” states many numbers and statistics but without any citation. I especially liked the patterns on color, particularly the one on Persian culture, and the one about colors and appetites. The design solution matches very well with the pattern language – the use of screens is quite beautiful. All in all a very nice project and pattern language!

Reply of Expert Reviewer #2: I found the outline in Chapter III very useful since it demonstrates the questions and design problems for the restaurant in a basic bullet format. I think this would be very helpful for a person who is not familiar with pattern language to see how each point/problem from the guideline transforms into a pattern. It then develops and unfolds in the pattern format in order to resolve the problem, provide a
solution, and demonstrate the result of the problem solving process. I truly hope that the pattern language that you created for the restaurant will aid future architects, designers, contractors, and restaurant owners into creating a more sustainable, green, and humane spaces without undermining their creativity and imagination.
CHAPTER V
DISCUSSION

The purpose of this project was to propose an alternative design approach based on Christopher Alexander’s Pattern Language theoretical framework, in particular to a restaurant environment. The design proposal aimed to solve current issues of sustainable design relative to overwhelming dependency on technology by considering both Humane and Green principles lead to promote overall restaurant’s environment quality. Fundamentally, the essence of the presented project was to apply a sustainable design process rather than a specific image to design a particular restaurant context. From a practical perspective, the outcome of this project provided a set of guidelines that can be applied by architects, builders, designers, or any individuals who are involved in designing restaurants.

To achieve this purpose, at the first step, based on series of interviews, observation and literature reviews, the study developed a set of guidelines divided into two major parts: “Humane patterns” and “Green patterns”. In the next phase of this project, these guidelines have been applied as a fundamental structure to write the restaurant’s setting pattern languages using the Alexander (1979) pattern theory. Consequently, a schematic design proposal was presented based on the created patterns. The adopted Pattern Language was then evaluated by two experts in Pattern Language and suggestions were made by the experts.
Discussion the Findings and Modifications

Discussion of the Expert Evaluation

Post-design Evaluation of the project involved evaluation by two experts in field of Pattern Language. The experts evaluated the new structure of pattern, and its outcome. In Chapter 3 – Methodology and Chapter 4 – Results, the expert reviewers, the questions and their responds and feedbacks were detailed. Expert Reviewers’ comments and feedback were very encouraging, while demonstrated that more can be done in the field of Pattern Language and its improvement.

Based on the comments by Expert Reviewer #1 improvement is needed in two critical directions: Weight the patterns in terms of importance, and to cross reference patterns with one another. The expert advice has been found very beneficial in better implementation of the patterns, especially if there is any limitation involved with the application of all patterns. Using and applying a value system to patterns was besides the scope of this thesis. The same applied for cross referencing them. Hopefully, future graduate students take this advice into account in order to develop a value system and cross reference of patterns. The reviewer also made a note that some patterns should have a more poetic title. However the effort has been made to select the best title for each pattern, the expert was not satisfied with some of the patterns title and suggested to write the titles more poetic and descriptive. The reviewer also recommended some altered ways in order to improve the provided patterns, such as making the category headings and subheadings and pattern titles all more different. However, expert suggestion contributes to find the patterns more easily, not much can be done in this project regarding those elements, because of the university’s required formatting such as consistent use of font.
The expert also suggested starting each pattern in a new page, which already has been implemented in finalized patterns. Furthermore, the expert #1 believes the Pattern Language and solutions are strong. The patterns provide very good and practical information that covers a lot of elements at many levels of scale, and are quite easy to follow. It was interesting that the expert found “Green patterns” more successful than “Humane patterns” in terms of stating the problems. The expert reviewer found the design solution a great match with the pattern language.

     The Expert Reviewer#2 suggested useful strategies to make patterns more applicable for client/owner of the restaurant. For instance, the expert recommended, “to add some specific information; such as where the goods and services could be found in the area: a local lighting store, a paint company where low VOCs paint can be found, and so on”. This suggestion is considered beneficial especially for practicing architects, interior designers and general contractors but is beyond the scope of this thesis. Also, the Green patterns were practically focused on the selected restaurant, however; in this project the Green patterns are more general and can be applied to other restaurants. The expert also found it interesting if this project could be seen completed and post occupancy evaluation could occur. Unfortunately in this project, although the intent was to place a post-test evaluation, it was not fully accomplished due to time and budget restraints.

     After all, the expert found the created patterns and their structure understandable, and easy to follow especially for individuals who are familiar with the Pattern Language theory. The expert believes since the patterns were primarily based on the concerns of the owner, contractor, clientele, and literature review, it would improve the overall dining
experience. It was also pointed out that the patterns provide a helpful guide to a more holistic sustainable approach, because the pattern language so carefully focuses on sustainability, green design, energy efficiency, and their applications into design of an everyday environment.

Implications

The approach for this project was geared towards developing a pattern language more specifically for a casual oriental restaurant that integrate both Humane and Green design aspects. Although this path was taken for this project, it could also be a good idea to create an approach or set of guidelines for any other restaurant types like fast foods, upscale restaurants or cafes.

In addition, restaurant trends are continually changing as is the technology. This approach can always lend a hand in guiding someone along the design process, but current trends and current technologies should always be considered and applied.

Furthermore, in the future, this approach may be modified even more to create a design process for other types of spaces or facilities besides the restaurant such as hotels, hospitals, doctors’ offices, workplaces, stores, sports arenas, etc.

A major shortcoming faced in this project was that even though the intent was to actually test the created pattern language through renovation of the subjected restaurant, as well as placing a post-test evaluation, the intent was not fully accomplished due to time and budget restraints. Hopefully, a future graduate student could take the lessons learned from this pattern language and could apply them to creating another pattern language and use it to design and renovate a restaurant project.
Conclusion

This project attempted to contribute the needs of new approach to a contemporary view of sustainability, primarily in the restaurant design. This new design approach aimed to integrate both Humane and Green aspects of design to enhance the environmental quality by taking to consideration humane wholeness and esprit of place, while utilizing technical means to better utilize limited natural sources (Pontikis, 2010). Patterns Language, which has been used as the theoretical framework of the project, incorporated both Humane and Green design principles in order to be used as a set of guidelines in the restaurant’s design.

Although several researchers have attempted to explore various applications of the Pattern Languages and more holistically approach to sustainable design in a variety of fields, no one to our knowledge has applied a Humane-Green pattern language to the restaurant setting. In conclusion, this exploratory study took the beginning steps toward understanding how sustainable design needs to perceive both Humane and Green design’s principals, and how creating a Pattern Language could contribute toward sustainable intentions through the design process.
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APPENDIX A
EXPERT EVALUATION

Introduction letter and questionnaire to the experts

The purpose of this letter and questionnaire is to obtain an expert’s opinion regarding the subject matter as part of a Family and Consumer Sciences Interior Design Graduate Masters Project. In particular, the topic being referred to is to create a pattern-language based design proposal for a restaurant setting. The provided patterns are emphasized on both humane and green design’s aspects.

Please, take the time to go over and review the attached Restaurant Pattern Language and the following questionnaire and return your response via-email. I firmly believe your response and expert opinion will help me improve this provided pattern language.

Thank you in advance for your help, cooperation, and expert opinion. If you have any questions regarding the subject matter, please do not hesitate to e-mail or call me.

Questionnaire:

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

2) How useful will the pattern language be to someone who is designing a restaurant context?
   Please rate from 1 to 10 scale with 1 being “not useful” and 10 being “very useful”

3) Is the pattern easy to follow?
   Please rate from 1 to 10 scale with 1 being “not easy to follow” and 10 being “easy to follow”
4) Can this pattern language provide a helpful guide to a more holistic sustainable approach?

5) Are there ways the provided pattern language can be improved?

6) Can applying this pattern enhance the overall dining experience?

7) Please note any other comments or suggestions in the space below.
APPENDIX B
RESTAURANT’S CONSTRUCTION PROCESS
The following images show the restaurant’s existing situation and the renovation process.