Environmental ethics and sustainable design: A case study on the traditional Korean residential building type: Han oak

Na Han

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Environmental Ethics and Sustainable Design:
A Case Study on the Traditional Korean Residential Building Type: Han Oak
by
Han, Na

Thesis
Submitted to the School of Engineering Technology
Eastern Michigan University
In partial fulfillment of the requirements

For the degree of
MASTER OF SCIENCE
in
Interior Design

Thesis Committee:
Shinning S. Shyu, Ph. D., RA, LEED AP
Jiang Lu, Ph. D.
James J. Stein, Ph. D.

November 05, 2013
Ypsilanti, Michigan
Dedication

To my parents, Han-jin Han and Jung-ja Cho,

my family,

and my sweetheart,

for their support, care and love.
Acknowledgements

To my advisor and committees, Dr. Shinming Shyu, Dr. Jiang Lu, and Dr. James J. Stein, for their constant support.
Abstract

Originated in the realm of philosophy, environmental ethics takes into consideration the moral relationship between human and non-human world. In light of the severe impact by human activities on this planet, environmental sustainability has become an extremely important issue that prompts building designers to perform in accordance with sustainable principles to create comfortable, eco-friendly space. Moreover, it is to be our obligation to preserve the environment for the future generations to come. This research studies environmental ethics and sustainability with a focus on sustainable ethics and strategies introduced in traditional Korean building design. It explores how renewable principles and materials were used in such a way that harmonizes the man-made with the natural environments. The paper argues that it is imperative to view environmental ethics as a universal value and traditional Korean building design may provide some valuable lessons.
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Chapter 1: Introduction and Background

Introduction

In response to the drastic climate changes, an ever-increasing human population, and the potential depletion of natural resources, architects and designers have started to experiment in compliance with sustainable design principles.

Karolides (2011) found the following:

Buildings use almost 40% of the total energy and materials used in the U.S. and contribute almost 40% of the total waste that ends up in landfills in the U.S.

Moreover, of the 154 million tons of waste that is generated in America annually, half could be reused; however, designers only reuse a small part of these wasted materials. (p. 3)

This is critical because buildings, collectively, generate one of the biggest impacts on Earth’s ecosystems. Originating in the realm of philosophy, environmental ethics takes into consideration the moral relationship between the human and non-human world. In light of the severe impact by human activities on this planet, environmental sustainability has become an extremely important issue that prompts building designers to perform in accordance with sustainable principles to create comfortable, eco-friendly spaces.

Moreover, it should be our obligation to preserve the environment for future generations.

People make land for use of our purposes, including needs for food and economic benefits, and so on. They want to have a comfortable and efficient site with a lot of opportunities to fit their needs. The environment is not the site which people use and put under their control only for human needs. Golany (1995) found the following:
We define environment as all of the natural landscape as well as the socioeconomics-physical and human-made environments surrounding us. With our advanced science and technology, we are confident that we can create a balance between our resources and our needs and that we are able to understand the forces behind these two strata of the environment. (p. 1)

Instead, people should be careful to control their environment and then keep a balance of natural elements and demands. For these reasons, endeavoring toward sustainable design process in architecture and design is very important. This is because this process enables architects and designers to use natural surroundings with environmental considerations.

Environmental ethics are philosophy and theory which suggest how people consider surroundings and use natural material elements for protecting the environment for future generations. Golany (1995) found the following:

We define ethics as the norms and standards constituted by the society to retain order and healthy management in its social and environmental setting. Ethic is the discipline by which we measure what is good and bad, right and wrong, and moral obligations. (p. 1)

Moreover, this theory educates architects and designers about their duty and obligation toward the use of natural environments and site development for human needs, such as building a house and designing interior space. This theory enables people to apply environmental philosophy to life, society, and economy as the code, standards, and way. Architects and designers can utilize knowledge of environmental ethics and sustainable design principles.
Environmental Ethics

Environmental ethics are the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on a large variety of disciplines including law, sociology, theology, ecology, and geography. Architects and designers should consider environmental ethics on their projects. There are many aspects to consider, including why designers should think about sustainable principles in their design projects, what environmental obligations designers need to keep for future generations in their design projects, and honest ways of using sustainable design concepts and materials. Furthermore, architects and designers should carefully understand environmental ethics in their design process and apply ethics to the design. It is significant that analyzing what the natural factors are and the kinds of impact they give during the thought process of environmental ethics.

Sustainable Design

Sustainable design is ecologically friendly design that enhances both the environment and human. Sustainable design preserves natural surroundings and produces economic benefits, such as results in decrease construction material cost and increase of energy efficiency. As sustainable design becomes an increasingly important issue and the cost of energy and increase, people demand that designers be more responsible (Jones, 2008, p. 3). For sustainable design, architects and designers should find the definition of natural environments and human-made environments. People use natural environments to create human-made environments for meeting human purposes, such as protection, safety,
and aesthetics. Whereas, sustainable design considers the relationship between nature and
manmade buildings. The most important thing is to seek harmony between the
environment and human being. Golany (1995) found the following:

   Environmental design is concerned with achieving a balance between human-made
   physical creativity and the reciprocal influence of natural forces. Furthermore, the
   environmental design field is the study of the complex relationship within each of
   the town environments as well as between the two environments. (p. 17)

Sustainable design has an effect on environmental problems, such as nature source
consumptions, environmental pollutants, and excessive energy usage. Before designing
the environmental and sustainable design, architects and designers also should consider
similar views and thoughts toward the environment of western and Asian architecture.
Even if two architectures in Western and Asian cultures design building with different
style and shape, they have similar architecture and design principles. The fundamental
principles have similar consideration toward environment and human beings.

**Statement of Problem**

   Originated in the realm of philosophy, environmental ethics takes into
consideration the moral relationship between the human and non-human world. In light
of the severe impact of human activities on this planet, environmental sustainability has
become an extremely important issue that prompts building designers to perform in
accordance with sustainable principles to create comfortable, eco-friendly spaces. Over
the last decade or so, sustainable design has been gaining popularity in building design
and construction industry. Modern technology has been invented and adapted in building
design and activities. This study will explore whether the sustainable principles were used in traditional Asian buildings. Further, the study will look into the role of international drive environmental ethics play in building environments.

**Purpose and Objectives of the Study**

The purpose and object of the study is to understand environmental ethics and sustainability with a focus on sustainable ethics and strategies introduced in traditional Asian building design. This study explores that the sustainable principles were used in traditional Asian buildings. Further, the project will look into the role of that internal drive environmental ethics plays in built environments. Moreover, it explores how renewable principles and materials were used in such ways that harmonize the man-made and natural environments. This paper argues that it is imperative to view environmental ethics as a universal value and traditional Asian building design may provide some valuable lessons.

**Significance of the Study**

This study is significant because it investigates traditional building design and takes a new approach to research environmental ethics and sustainable design principles. This study confirms sustainable design can be studied from the perspective of environmental ethics. More specifically, the study examines environmental ethics in Asian culture through traditional building methods, and finds ways to apply them to Eastern building design. Indeed, this research can analyze how designers are able to maximize building performance by integrating with environmental conditions. Also, the
view of environmental ethics as a universal value and traditional Asian building design may provide some valuable lessons in Western architecture and design.

**Delimitations of the Study**

Despite the research of the study being conducted through available sources, delimitations of the study reside in limited access to on-site research and empirical data collection. In other words, the nature of the study will be more qualitative approach than quantitative. The main research is of building design and environment, focusing on the relationship between environmental ethics and sustainable design.
Chapter 2: Review of Literature

Environmental Ethics

Environmental ethics are the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on a large number of disciplines including law, sociology, theology, ecology, and geography. Architects and designers should consider environmental ethics during their projects. There are a lot of considerations, such as why designers should think about sustainable principles in their design projects, what environmental obligations designers need for future generations in their design projects, what are honest ways of using sustainable design concepts and materials. Furthermore, Architects and designers should carefully understand what environmental ethics in design means (Golany, 1995).

The study of American environmentalists, Henry David Thoreau and John Muir will enhance this research by answering a few key questions. This is because the environmentalists give answers to problems. First, defining environmental ethics, determining its importance, and discussing application in American culture. Winchip introduces that the understanding of Henry David Thoreau regarding how he recognizing the environment, human needs, and nature sources with the beauty of Walden Pond in his book (Winchip, 2007, p. 13). Moreover, Winchip explains John Muir’s contributions which are the study of the Sierra and its significant impact on America environmental history. Winchip (2007) found the following:
The uplifting quality of Muir’s writing inspired many people to appreciate nature and conserve the natural beauty of mountains, meadows, and forests. Muir’s influence was responsible for the concept of developing national parks and was involved with starting Grand Canyon, Sequoia, Mount Rainier, and the Petrified Forest. Muir’s focus on national parks prompted Theodore Roosevelt to become involved with preservation by creating federal conservation programs. (p. 13)

The purpose of American environmentalists is to enlighten people in regards to facing and considering substantial environmental problems. For introducing and suggesting traditional Asian environmental ethics and architecture, the study of American environmentalists is an essential process. This process can show that environmental ethics are universally valuable and provide important lessons all over the world.

To understand the importance of environmental ethics, architects, designers, and people in general should recognize the reason for taking care of the environment. Not only currently architects and designers can meet the needs of people, but they should also assist the future generation. Now is the time for people to think about what they take out of the earth and restore natural resources. Environmental ethics emphasizes the relationship between people and the environment and a balance of natural resources and human needs. The ecological philosophy enables people to be more honest about use of nature and responsible for the environment.

**Sustainable Architecture and Design**

Sustainable design protects the environment and preserves natural resources for future generations. Sustainable architecture and design can sustain and preserve the
environment, save money and time when compared to new materials, and also support LEED (Leadership in Energy and Environmental Design) efforts. Moreover, sustainable building methods and materials not only sustain the environment, but also have economic benefits, including saving money and time, creating new jobs, and reducing construction waste (Jones, 2008, p. 13). Therefore, it is imperative that designers adopt sustainable design concepts and find ways for adopting them to projects effectively. Sustainable design is an environmentally responsible design methods. Sustainable design methods are used by designers to improve design quality and to reduce negative impacts of design. Jones (2008) describes environmentally responsible design and identifies the 3Rs (reduce, reuse, recycle), as methods to protect the Earth’s ecosystems. The author emphasises designers’ endeavours to decrease the quantity of wasted materials (Jones, 2008, p. 31).

First of all, the meaning of sustainable design concepts and development should be clearly defined for sustainable design discipline application. Next, the background of sustainable development should be recognized. It is critical that architects and designers become aware of background issues for applying sustainable design concepts. Some examples of background issues are environmental movements, national legislation, global problems, ethics, and social justice. And then, people should know how principles of sustainable development are consisted of three interdependent components, such as society, environment, and economy (Winchip, 2007, p. 4). Also, the ecological friendly design discipline has relationship with sustainability, ecology, and environmental science. The author explains and defines sustainable development in his book. Winchips (1995) study found the following:
These two basic definition of sustainable and develop serve as a good foundation for understanding the concept of sustainable development. The combination of two words together describes a concept that is focused on sustaining any of the resources that are growing or expanding. Resources can include people, the environment, financial capital, and technology. (p. 4)

People live in the Earth and use all resources for social developments. However, it is easy to be less responsible and careful about the usage of resources because economic and political reasons. People should remember that they cannot live without environmental and nature resources. People and the environment live together and rely on each other. Now is the time to require humanity, humility, and honesty toward the Earth.

The continuous study of sustainable design processes, practices, and educations are required for improving sustainable strategies (Winchip, 2007, p. 4). This is because people easily are regardless to the ecological problems and sustainable design concept for pursuing economic benefits in business practices. To solving problems of public indifference, research about future sustainable strategies and education are necessary. Moreover, Thoreau and John Muir, United States legislations, and the Brundtland Report have historically supported sustainable design principles.

**The Brundtland report.** The environmental report of WCED (the World Commission on Environment and Development), “Our Common Future”, assessed decisive environmental issues in 1987. This report of global agreement was issued by the United Nations. The report examined environmental issues which are associated with the common concern of an environmentally threatened future, sustainable development, and
international economy, common challenges of human resources, special ecosystem, energy, industry, and urban challenge. In addition, this report analyses common endeavors of managing the commons, security, and common action (WCED, 1987). According to the Brundtland Report (1987), “Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.” (p. 24). The report discusses sustainable development with decisive problems, such as indifference towards the environment and exhaustion of natural sources. It is important to consider future generation and improve sustainability in architecture and design for common concerns like managing and protecting the environment.

**LEED (Leadership in Energy and Environmental Design).** When architects build and design green buildings, they have to use policies of Leadership in Energy and Environmental Design (LEED) and get verification from LEED. This is because LEED’s purposes are to improve sustainable buildings and develop the qualities and impact of green building. The U.S Green Building Council (2010) describes “LEED as an internationally recognized green building certification system”. LEED is a certification program that seeks sustainability and measures buildings’ sustainable features such as sites, water and energy efficiency and materials and resources. Architects who have goals working toward sustainable structures try to make efforts for standard green methods to evaluate the sustainability of green building. Also, LEED supports sustainable efforts of ecological building (Parris, 2007, p. 1). Architects can obtain valuable feedback from ecological constructions and can appropriately adjust to LEED’s useful standards
Architecture in Western Culture: The Ten Books on Architecture, Vitruvius

The Roman architect Vitruvius informs us of the fundamental principles of architecture in his book, *The Ten Books on Architecture*. He explains standards of architecture for the ideal quality of public and private buildings. Vitruvius subdivides the principles into different chapters and gives meaningful explanations of disciplines of architect, materials, temple construction, communal buildings, the private houses, water supply, the solar system, and construction machinery. Architects should be educated and follow the philosophers carefully to become acquainted with this historical knowledge. Vitruvius introduces that how ethics and theory work with design principles in architecture. Vitruvius (1999) found the following:

As for Philosophy, it makes an architect high-minded and nor self-assuming, but rather renders him courteous, just, and honest without avariciousness. This is very important, for no work can be rightly done without honesty and incorruptibility. Let him not be grasping nor have his mind preoccupied with the idea of receiving perquisites, but let him with dignity keep up his position by cherishing a good reputation. (p. 5)

Ethics and theory allow architects to consider their surroundings with respect and morality. They draw attention to the significance of architecture principles in various fields of study that can be related to approaches to building designs.

In an influential treatise on the Western history of architecture, the author emphasizes awareness of architecture and water. His principles also include sustainable design and traditional Asian building design in environmental ethics and water
managements. Vitruvius discusses the important of architectural education in book one. Architects should learn basic aesthetic and technical principles, such as the art of building design, the making of timepieces, and the construction of machinery, which emphasize durability, convenience, and the beauty of building (Vitruvius, 1999, p. 15). Moreover, the author states that the fundamental principles are order, arrangement, eurhythmy, symmetry, propriety, and economy. He also stresses the importance of using proper materials and natural elements materials in building construction.

In book eight, Vitruvius explains about water and the provision of water supplies. Water is one of the main natural sources which people can use for many purposes, such as living, drinking, farming, and energy. The nature sources have great influence on the life quality of humans. The author indentifies the four elements and the pre-eminence of water which are explained in their different properties; hot spring, cold water, water with Natron, a naturally occurring mixture of sodium carbonate decahydrate, and spring. The water is vital because it supplies to human living and improves human needs with appropriate quality. For these reasons, a course of examination, finding, controlling, and improving of water are carefully considered in architecture (Vitruvius, 1999, p. 237).

**Traditional Asian Architecture**

Oriental architecture considers and concentrates on harmony and the relationship between environment and architecture because architecture in traditional Asian culture is an essential part of human living (Bussagli, 1973, p. 362). People live in their homes and are protected from dangerous environments. The home design also creates relationship with their natural surroundings. Architecture and the home should be harmonized through
its design system in order to harmonize well with the natural surroundings. Asian ancient architects emphasize the importance of natural environments on human living because of Asian philosophy and culture. For this reason, ancient Asian cultures apply the Fen Shui design method and system to all of their architecture and design.

Environmental Ethics in Traditional Asian Architecture and Design. Asian architecture and design consider the building site, shape, and system carefully for the ideal location for building a house. Residents’ selection of site, location, and surroundings are an important part of Asian architecture. The sustainable design principles in traditional Asian architecture and building design systems are also useful in Western culture building design. For these reasons, Asian culture, architecture and designers try to study housing and sustainable principles in traditional Asian architecture and housing design. Analysis of Asian environmental ethics, Feng Shui, is a reflection of environmental design thought. Feng Shui shows that how ancient Asian people develop philosophy and ethics in their building design concepts.

Feng Shui. “Feng Shui” is Asian architecture and design concept. It was developed over three thousand years ago in China. This complex body of knowledge is based on an understanding of nature that is believed to help us balance the energies of any given space to ensure the inhabitants’ good health and fortune. Over four thousand years old, this ancient Chinese art of placement allows the free flow of energy and guides our lives toward harmony (Yoon, 2006, p. 3). The meaning of Feng Shui comes from a Chinese traditional poem which provides a vivid description of nature. The words Feng Shui come from the Chinese characters wind and water (Smith & Stewart, Feng Shui: A
Practical Guide for Architects and Designers, 2006, p. 1). Smith and Stewart (2006) found the following:

Air and water are the two most essential necessities for our survival. The ancient term that was used for the concepts of Feng Shui was k’an you, words meaning cover and support and loosely translated as under the canopy of heaven.” (p. 1)

When understanding the philosophy and history, and the development of Feng Shui in buildings, architects and designers will find universal value and lessons which also are related to western environmental ethics.

It is important to look at basic principles and applications of Feng Shui for space design and its purpose. Architects and designers should inquire about basic space design principles, the flow or energy, Chi, and the balance of energies, Yin and Yang. Usually problems of space are caused by disorder of two basic principles, the flow of energy and the balance of energies (Smith & Stewart, Feng Shui: A Practical Guide for Architects and Designers, 2006, p. 13).

First of all, traditional Asian environmental ethics explain the flow of energy with the word Chi. The smooth flow of Chi means smooth energy movement of sky, human, and earth, ensuring the health life within a building. The energy movement improves the elements of energy flow, doors, windows, furniture, beams, column, ceiling, wall, and clutter or organization.
Figure 1. Chi: Door Relationships (Smith & Stewart, 2006)

Figure 2. Chi: Beams (Smith & Stewart, 2006)
Here are factors that give impact on the environment. Design components like colors, shapes, and materials impact the environment and can cause problems in daily life. The symbol of Yin and Yang explains that they are completed each other, consisted of always together. In environmental ethics, the balance and relationship of nature and human being are considerable issues to maintaining natural resources. People should return what they take out from nature because it is moral and responsible of them. Of course, it is important to meet the current needs and wants of human beings, but environmental ethics emphasize consideration toward future generations. Architecture and designers can analyze how they consider natural surroundings for find some solutions by examining traditional Asian building design. The balance of energy, Ying and Yang can support sustainable design concepts in building environments, water management, material usage, and indoor air quality.

*Figure 3. Chi: Opposite Door Way (Smith & Stewart, 2006)*
For solving and improving the space design problems, designers should follow Feng Shui principles which consist of the commanding position, the Bangua, and the five elements. The five elements of Feng Shui explain natural sources and how they work in architecture and design. The elements are water, wood, fire, earth, and metal. These natural sources can clarify the traditional concept of environmental ethics in Asian culture (Smith & Stewart, 2006, p. 53). Sustainable design considers drinkable water quality, water preservation, water efficiency, and rain water harvest.

Figure 4. Yin and Yang Symbols (Smith & Stewart, 2006)
Figure 5. The Five Elements; Producing and Overcoming Cycles (Smith & Stewart, 2006)

Figure 6. The five elements (Smith & Stewart, 2006)
Chapter 3: Research Design and Methodology

Research Design

The research paradigm is a qualitative paradigm and the intent is to gain an in-depth understanding of the architects and designers’ decisions regarding environmental ethics and sustainable design in their design projects. Research design paradigms are the positivistic paradigm and the structural functionalist (social systems) paradigm. The intent of the positivistic paradigm is to discover the rules governing social life scientifically and the intent of the structural functionalist (social systems) paradigm is to discover what functions the many elements of society perform for the whole system.

Research Method

The research method is a case study that is one of classifications of field research to describe and to get in-depth understanding of environmental ethics and sustainable design. The case study’s intent is an idiographic understanding of the specific case under examination and analyzing multiple case studies for enhancing general and nomothetic theories. In addition, elements of case studies are conducted to determine what affects architects and designers’ decision to consider environmental ethics and sustainable design in their projects, then combines elements of case studies for a mega-analysis to gain a broader perspective of the factors that affects architects and designers’ decision to apply environmental ethics and sustainable design to their design.

Methods and Procedures

Research methods are studying environmental ethics of traditional Asian architecture, Feng Shui, and traditional Korean house, Han Oak. The procedures are
examinations of design disciplines in traditional Korean house, Han Oak. Indeed, they are explorations of similarity and relationship between traditional Asian architecture and Western architecture.

**Research Questions**

Research questions and hypothesis are following:

Why should architects and designers consider environmental ethics and sustainable design?

Why are environmental ethics important for sustainable design?

What is environmental ethics in traditional Asian buildings?

What are similarities of designs between the traditional Asian building and international architecture?

How do sustainable design principles compare in different cultures?

How are traditional Asian environment ethics applied to international or Western culture architecture and design?

**Validity and Reliability of a Case Study**

The case study (field study) provides superior validity and comprehensive measurements available to field study to get an in-depth meaning of concept. Also, Field studies usually give detailed illustrations. Field studies have reliability issues because of a possible conflict with person point of view. The research results also may not be replicated by another researcher. However, if a researcher reports fairly, the research will be wary of purely descriptive measurement in field research. I will be able to triangulate
the data because I will obtain the data from several different sources to support the conclusion.

The traditional Korean house, Han Oak, has historical value because it represents traditional Korean building construction. Also, in Korea, there are a great number of Han Oak residential buildings preserved. The case study on Han Oak provides a clear building type for sustainable residential buildings.
Chapter 4: Presentation and Analysis of Research

Passive Design

Passive design is a sustainable building design system because it applies solar energy to architectural design process. Passive solar building design uses passive solar strategies for heating, ventilation, air quality, and natural lighting system. Also, the ecological design system examines effective energy uses and balance in a building for people who use the place (Winchip, 2007, p. 149). Passive House Institute U.S. (2011) found the following:

A Passive House is a comprehensive system. “Passive” describes well this system's underlying receptivity and retention capacity. Working with natural resources, free solar energy is captured and applied efficiently, instead of relying predominantly on ‘active’ systems to bring a building to ‘zero’ energy. High performance triple-glazed windows, super-insulation, an airtight building shell, limitation of thermal bridging and balanced energy recovery ventilation make possible extraordinary reductions in energy use and carbon emission.

(http://www.passivehouse.us/passiveHouse/PassiveHouseInfo.html)

The passive design concept makes a clear understanding about sustainable architecture and design thought. Passive design uses the sun which is one of the reusable natural resources and it is plentiful energy source. With passive solar design elements, thick walls, big and high windows, solar insulation system, building seal construction, energy conduit control, ventilation, use energy waste will be dramatically reduced.
Figure 7. Sun Angles in Northern Latitudes (Binggeli, 2010)

Figure 8. Window Proportions for Daylight (Binggeli, 2010)
PHIUS (Passive House Institute U.S. (2011) explains passive design as the highest energy standard for energy saving in houses and buildings. This opinion is supported by the U.S. energy information administration data. According to Passive House Institute U.S. (2011), “Buildings are responsible for 48% of greenhouse gas emissions annually and 76% of all electricity generated by U.S. power plants goes to supply the Building Sector.”

(http://www.passivehouse.us/passiveHouse/PassiveHouseInfo.html).

Using passive solar power in buildings will fulfill the sustainable design’s goals and public’s expectation. Passive solar design can result in economic benefits of construction design and maintenance. Indeed, passive solar building system can result in energy efficiency. Wolfgang (2007) introduces the passive house as the standard of energy efficient building. He says that the “energy saved on heating is 80% compared to conventional standards of new buildings. The energy requirement for heating is lower than 10 to 20 kWh/(m²a) (depending on climate), adding up to a low cost. Therefore high energy prices are no longer a threat to Passive House occupants.”

(http://www.passivhaustagung.de/Passive_House_E/passivehouse.html).

Passive solar heating system is a sustainable energy strategy that uses passive solar to heat building space for providing heating load. The strategy can reduce energy consumption of buildings dramatically with the location of building and size and adaptation of windows (Walker, 2011, p. 121). Walker (2011) explains that solar heat is stored in winter and is released in summer for building heating. Passive solar heating system consists of direct grain, sunspaces, and Trombe walls with construction factors,
such as windows, insulation, and mass. The elements admit and store the heat and insulate buildings (Walker, 2011, p. 130). The author also describes the significance of solar radiation and the sun position, so that buildings are designed to face south for effective passive solar design. Winchip (2007) found the following:

The fundamental design of passive solar heating in the Northern Hemisphere is to maximize the penetration of sunlight in the winter and control the heat in the summer. This is achieved by situating the building in the optimum position. The structure should be built on the east-west axis, which a large area of glazing on the south-facing wall. The structure should positioned to ensure that adjacent buildings, geographical features, or evergreen trees do not block the sun from striking the south-facing wall during the winter. In cold climate, the shape of the building should minimize exposure to harsh winter winds. In winter climate, the shape of the building should maximize cross-ventilation. (p. 159)

Architects and designers should understand passive solar construction standards for effective application of passive solar heating. This is because passive solar heating systems need enough solar heat to operate a system regardless of mechanical instrument power and system components to improve system quality.

Passive solar design has a certification program which gives architects and designers passive house guidelines and evaluates their design based on passive house criteria. PHIUS (Passive House Institute U.S) is the U.S nonprofit organization and passive house building standard and it provides a training program and instruction for architects and designers (Passive House Institute US, 2011). Building design and system
are certified by PHIUS verification and they try to satisfy the energy performance reducing energy use. Passive solar is an environmentally responsible concept that enables the environment and human life to improve. For these reasons, passive solar methods are used by architects and designers to improve building design quality and to reduce negative impacts of building on the environment.

**Similarity and Relationship between Feng Shui and Sustainable Design**

By developing research study in environmental ethics and sustainable design of Western culture architecture, similar consideration toward natural environmental and man-made human living are recognized. The traditional Asian architecture principle, Feng Shui, includes Asian environmental theory and principles for ecological architecture and design on fundamental design processes.

**Sustainable Strategies for Application to the Building Environment.**

Sustainable strategies are improved by environmental and green building systems. The strategies provide environmentally friendly design directions to architects and designers. Indeed, each sustainable design solution has a close relationship in design qualifications and energy saving. For decreasing building natural source usage, sustainable disciplines can be used as solutions of energy and water consumption. So, it is critical to understand impact of sustainable mechanical systems, lighting, building envelope, and water management on building environment.

Sustainable technical field are comprised of mechanical systems and lighting (Winchip, 2007, p. 147). It is important that architects and designers try to have a full understanding of each technical field and influence of technical elements for sustainable
design processes. According to the author, building energy consumption takes a significant part of the total energy usage in the United States and generates hazardous emissions such as carbon dioxide, sulfur dioxide, and nitrogen oxide (Winchip, 2007, p. 148). For these reasons, decreasing building energy consumption is recognized as a major part of the issue. The attempt of architects and designers is required for improving energy efficiency and performance in building environment.

Mechanical systems of sustainable strategies need standards, such as ANSI (American National Standard Institute), ASHRAE (the American Society of Heating, Refrigerating and Air Conditioning Engineers), IESNA (Illuminating Engineering Society and North America) Standard 90.1-2004, and LEED (Leadership in Environment and Energy Design) certification. This involves requirements of HVAC system, natural ventilation, raised flooring distribution methods, day lighting, electrical lighting sources, insulation, windows, and renewable energy sources (Winchip, 2007, p. 148). Moreover, the system results in economic benefits because it can enhance building energy and reduce energy cost noticeably.

*Figure 9. Certificated Sustainable Standards_ ANSI, ASHRAE, LEED*
HVAC (Heating, Ventilating, and Air-Conditioning) systems are mechanical heating and cooling control system that use air and water. They manage building spaces’ temperature, humidity, air purity, distribution, and motion of air. The systems make available thermal comfort and air quality with mechanical equipment in buildings (Binggeli, 2010, p. 228). HVAC systems improve energy performance by gathering building energy, preventing wasted building energy, and maintaining proper air quality. Winchip (2007) found the following:

The efficiency of the design of a building affects the loads on HVAC system. Sustainable strategies for HVAC system focus on optimizing energy use and
maintaining healthy air quality. The four major ways to transfer heat are through convection, conduction, radiation, and evaporation. (p. 149)

The first functions of HVAC systems are utilizing convection, the movement of heat in the inside of a building area. The second is conduction, an occurrence of warm air. Next, evaporation produces heat and radiation generates heating air for the heating system.

Sustainable buildings seek to accomplish a goal of zero or minimum emissions in a building system. The goal can be possible with sustainable strategies, such as renewable materials, passive solar heating, and energy saving systems. Building envelope enables buildings to perform energy efficiently because the HVAC load is decreased by building envelope application. Building design elements, such as the walls, floors, roof, doors, windows, skylight, and slabs, implement optimal energy performance in a building envelope system. The purposes of design elements are to prevent energy passing from the inside to the outside and to decrease energy transfer in cooling and heating systems.

**Energy efficiency: HVAC systems, nature ventilation, insulation, and the flow of energy Chi.** The Feng Shui principle can be compared with modern architecture and design in sustainable design. The similarities are found in passive design which is the modern technological understanding of environment. Passive design works with natural resources, solar energy, and sites. Feng Shui emphasizes the importance of the smooth flow of energy, Chi, because it provides energy efficiency in the home for overall health. The smooth flow of energy can establish the level of energy efficiency and promote energy performance in heating and cooling building system.
Sustainable strategies for HVAC system are to provide heating and cooling control systems by using air and the systems make available thermal comfort and air quality in building environments. Also, passive solar design offers warm energy flow during the winter season for comfortable air quality. It also is controlled through solar power in the summer season for cross-ventilation.

The alignment of windows facilitates passive ventilation systems to achieve good air quality. Ventilation is an important consideration for proper indoor air quality in sustainable design. This is because the utilization of air conditioning has a considerable impact on indoor air quality and energy usage. In sustainable design, ventilation systems attempt to supply pleasant air and thermal balance without the occupants’ realization. Feng Shui design principles use natural air and allow it move through the space freely. HVAC systems in Feng Shui are applied with less mechanical methods in building design. The traditional design principle optimizes the natural air flow from windows alignment instead of mechanical systems. Specifically, cross ventilation brings out the effectiveness of natural ventilation.

LEED (Leadership in Environment and Energy Design) provides certain certification of building design projects for indoor air quality. The certification is a sustainable design rating system. It gives point in indoor environmental quality, also, sustainable site, water efficiency, energy and atmosphere (USGBC, 2013, http://www.usgbc.org/leed/rating-systems). LEED explains that the goal of their system is promoting better indoor air quality and improving the use of daylight and view in design project.
**Site selection.** The site selection is the first step of building construction. Feng Shui pays attention to the building site selection step for comfortable living. Optimal conditions are that the site faces north in order to obtain enough solar energy. Indeed, Feng Shui recommends building a house above a water table and keep safe distance from major water body for avoiding flood. Architects select the building site based on principles of Feng Shui and the concept shown clearly in traditional Korean house, Han Oak, topography, lighting, direction of the wind, road, water, surrounding, convenience in use are main factors of the site selection (Park, 2013, p. 18). A site with an open view is good for psychological pleasure in Feng Shui strategies. This strategy is also considered in passive solar design. Alignment of window facilitates passive ventilation to achieve good indoor air quality. Planting trees on the north side of the building is a design method for preventing cold wind in winter season.

**Renewable energy sources.** The five elements in the design of Feng Shui can suggest renewable energy sources in sustainable design. In Feng Shui, architects and designers taste water before selecting a site and locating buildings in the site. Also, they try to avoid the building site being located close to a body of water. Sustainable design considers drinkable water quality, water preservation, water efficiency, and rain water harvest. However, water quality is not the same as landscape irrigation.

In Feng Shui, wood is a natural source and it is used in most of building construction. Sustainable design discourages the overuse of wood in design field. It is possible that overuse will eradicate wood in the future soon. In spite of wood being a limited natural resource, it is increasingly exhausted by people nowadays. Architects and
designers take into account deforestation to preserve wood. They are responsible for studying how many forests are destroyed and what problems are caused by deforestation. Also, FSC and LEED state the importance of wood as a material in building design and construction projects. The council suggests methods for wood management in architecture and design.

Fire and sun are used in heating system as a significant energy source in traditional Asian building design. Solar energy and daylight are substantial energy sources in sustainable design principles. The definition of the nature source, fire, is mentioned in passive design which uses the sun and daylight for insulation of walls and uses less electricity for building systems. As mentioned above, solar energy is infinite and it is obtained from the sun. In passive design, buildings should face south for absorption and the release of heat. Natural heating energy improves thermal performance and energy efficiency in building design.

Environmental ethics and sustainable design maintain that the Earth should be preserved not only for the current generation but also future generation. People should take ethical responsibility for the earth and their effort is required. Architects and designers try to reduce landfill and construction waste by reused, recycled, and reduced materials to help prevent pollution, and to protect farmland and wetland. One of the main concepts of sustainable design is the application of metal which is recyclable and strong enough to reuse.

**South facing building, daylight, electrical lighting sources, and building envelope.** Building should face the south to gain more daylight which can be used in
building energy system, heating, and lighting. Daylight is a good natural source in environmental design because it saves electrical energy. It is an environmental and sustainable principle of building design. Windows are an element of sustainable mechanical systems because south faced building absorbs enough solar energy during daytime and release during night time for building heating systems. The alignment of windows increases the amount of daylight inside of a house and uses the sun as a lighting source which can decrease energy waste and cost in building system. Feng Shui recommends that architects and designers choose a building site that keeps proper distance form stale water. Raised floor distribution methods are considered with sustainable design in Feng Shui.

**Traditional Korea Residential Building Type “Han Oak”**

The name of Korean traditional houses is “Han Oak”. It shows that the development of traditional Korean houses with traditional Korean environmental ethics and building construction systems. Natural, social, and cultural environment are important when design Han Oak. The traditional Korean house is usually designed for upper class residences (Choi, 1999, p. 36). It is essential that understanding the nature and historical background of geomancy because of their impact on geomantic principles and application in Korean house design (Yoon, 2006, p. 15). Yoon (2006) introduces Geomancy in his book which is arises from Greek word “earth divination” and is a system which helps to choose a house with appropriate conditions. The system has established detailed principles for house design specifically with Han Oak in Korea. Geomantic principles take into account landforms, wind, water, and cosmological
directions. Landforms indicate the shape of mountains and hills for protective energy and calming winds, along with the conditions of soil for sustaining productive land. Wind has a relationship with mountains and hills in its condition and it refers to energy flow which should be protected for energy saving in building design. Maintaining good water quality is more important than concerns of wind and is influenced by mountains. Water and watercourse should be placed in front of the house for protecting energy flow which causes energy dissipation and waste. The energy performance of a house is preserved by mountains behind the house and water in front the house (Yoon, 2006, p. 71).

Figure 11. Han Oak (Hanoak Space Research Council, 2010)

The research shows studies those principles of Feng Shui and geomancy in tradition Korean residential building, Han Oak. The research helps to take in depth knowledge on the impact of Feng Shui and geomancy on Korean culture and society. The case study will result in valuable outcome, such as how to adapt traditional Korean architecture and environmental ethics for Western culture. The study results also will inspire architects and designers with sustainable suggestions from the wisdom of a different culture.
**Han Oak.** In the traditional Korean home, a house is not only a place for dwelling and to protect people from animals and the outside environment, but it also includes living and life of people (Jeon & Gwon, 2012, p. 38). The authors state that the understanding of the relationship between surroundings and the nature of the environment of people is very important. The house is a method of communication between people and the environment and it can cause significant effects to means of communication (Jeon & Gwon, 2012, p. 40).

The traditional Korean home, Han Oak, displays traditional Korean style architecture and house styles that utilize natural materials such as soil, stones, and straw. It distinguishes its design style from Western design style in formation, space arrangement, structure, elements, and interior design layout. The study of organization and materials of Han Oak allows architects and designers to understand traditional Asian buildings, especially in Korean residential buildings and applies its sustainability to international architecture.

![Figure 12. Han Oak: Floor Plan (Hanoak Space Research Council, 2010)](image)
**Structures and space elements of Han Oak.** The traditional Korean house is built-up wood structures with a base consisting of wood columns. This characteristic is shown in exterior and interior structures. Actually, Han Oak was developed with a style of architecture and consistent organization of structure based on residents’ high society in the past. The organization of structure should be studied first and then the composition of Han Oak explored to understand the traditional Korean house. Structure of Han Oak consists of a space, Kan, which is a basic formation of Han Oak and a square space with four columns. The formation of Han Oak, Kan, is a basic unit of space size calculation. The size of the space formation normally ranges between 7 foot to 8 foot and it related to wood material size. Based on the space formation of Han Oak, a square shape Kan, building construction is designed “ㄱ”, “ㄴ”, and “ㅁ” shapes and increased its size (Hanoak Space Research Council, 2010, p. 96).

The foundation of Han Oak is constructed on a stone foundation step and a height is three feet to four feet. For constructing the house, a foundation stone with a size of approximately one foot, is located on the stone foundation step at the same intervals, and then, put seven feet square columns on the step. The columns frame the basic formation, Kan, of Han Oak which is discussed in the former paragraph. Height and interval of wood columns of Han Oak mainly determine the size of the house. The ceiling and roof are connected without empty space, in other words, roof should be exterior shape and ceiling should be interior shape. The wall structure of Han Oak is a core wall with plaster finishing of wall and a paper wall covering. The door and window of Han Oak are arranged between columns (Hanoak Space Research Council, 2010, p. 97).
Figure 13. Han Oak: House Shapes (Hanoak Space Research Council, 2010)
Figure 14. Han Oak: Roof Structure (Hanoak Space Research Council, 2010)

Figure 15. Han Oak: Roof Structure and Elements (Hanoak Space Research Council, 2010)
The compositions of Han Oak is consist of main floor room or hall, room, kitchen with interior elements, such as wall, floor, ceiling, and window structures and finishes. The main flooring room or hall, Dae Chung, is a symbol of authority and wealth of high society. The space is open space and transfers to an area which connects outside and inside area and usually faces the north side. The floor of Dae Chung is made up a checkered floor system.

The kitchen of Han Oak is located in the main building of a house and it is a space for cooking and keeping food. Usually, the kitchen is facing southeast, contrary to the living room, which is faced north to absorbing enough solar energy, the kitchen is faced southeast because this area should keep low temperature for preserving fresh food (Hanoak Space Research Council, 2010, p. 103).

*Figure 16. Han Oak: Kitchen (Hanoak Space Research Council, 2010)*
Room of Han Oak is a closed space and is a multipurpose area in which people live, sleep, and eat. All of the interior structure, such as columns, girder, and cross beam, are covered with wall and floor covering (Hanoak Space Research Council, 2010, p. 103). Traditional Korean homes have a special floor heating system. The floor design is named “Ma Roo” and the floor heating system is named “On Dol” (Jeon & Gwon, 2012, p. 59). The flooring heating system, On Dol, is a distinguished heating system and which is only found in traditional Korean homes. The system uses heat by making a fire in the outside furnace and the heat warms up the flat stone and floor. The heating system uses conduction, radiation, convection of thermal energy for heating the floor and indoor air (Hanoak Space Research Council, 2010, p. 115).

*Figure 17. Han Oak: The Main Flooring Room (Hanoak Space Research Council, 2010)*
Figure 18. Han Oak: The Main Flooring Room Structure and Elements (Hanoak Space Research Council, 2010)

Figure 19. Han Oak: Checkered Floor (Hanoak Space Research Council, 2010)
Figure 20. Han Oak: Checkered Floor Structure and elements (Hanoak Space Research Council, 2010)

Figure 21. Han Oak: Door (Hanoak Space Research Council, 2010)
Figure 22. Han Oak: Room and Main Flooring Room (Hanoak Space Research Council, 2010)

**Sustainable principles in the compositions of Han Oak.** With the floor plan of Han Oak, the sustainable principles are described clearly. The main floor provides function like passive ventilation which allows the natural flow of energy and wind. Construction method shows sustainable principles of traditional Korean building design. The house is constructed on a raised platform to avoid flooding. Sunshade overhangs of the roof provide natural shade which decreases temperature of the house. The kitchen is located in the northern east side because it should be in a cool place. The food will not rot and will be kept fresh. The chimney is a radiant heat flooring system. It is located besides a building and decorated with traditional patterns for aesthetic purposes. The room uses renewable materials and timber structure and mud infill panel.
The interior wall structure of Han Oak is a core wall and the wall is finished with plaster and is covered again with a paper wall covering. A core wall is a technique used to build a slurry wall between columns. First, a small reinforcing post is erected inside of a wall at regular intervals and crossed stripes to make a grid pattern. The next step is to weave a straw and branch and cover the wall with mud. Finally, the wall is finished with plaster and wall coverings. The wall system is similar to passive solar wall technique, Trombe wall, which is thick mud wall and improves passive solar insulation system.

*Figure 23. Han Oak: Floor Plan (Hanoak Space Research Council, 2010)*
Figure 24. Han Oak: “On Dol” Structure and Elements (Hanoak Space Research Council, 2010)

Figure 25. Han Oak: Chimney (Hanoak Space Research Council, 2010)
Figure 26. Han Oak: Wall and Patterns (Hanoak Space Research Council, 2010)

Figure 27. Han Oak: Core Wall (Hanoak Space Research Council, 2010)
Figure 28. Han Oak: Firewall (Hanoak Space Research Council, 2010)
Chapter 5: Conclusions

Summary

People tend to think that sustainable design is a new idea for solving environmental problems in architecture and design areas. Architects and designers try to apply new technology to their building or display their new design talents. However, according to an influential architecture treatise in the Western history of architecture, “The Ten Books on Architecture,” written by Vitruvius (1999), the Roman architect, informs us that the fundamental principles of architecture that are highlighted by the author, such as firmness, accommodation, and aesthetics. In addition, he stressed the design methodology based on order, arrangement, eurhythmy, symmetry, propriety, and economy (Vitruvius, 1999, p. 11). Vitruvius enables architects to take essential knowledge for ideal architecture design, also, he considers the environment. Vitruvius treatise not only prompts architects to learn essential building knowledge for ideal architecture design, but he also emphasizes the environmental issues, such as site selection, building design relationship with environment, and natural source applications (Vitruvius, 1999, p. 12).

This will be the first step of essential design process in architecture. This means that architects and designers should contemplate a fundamental purpose of building design cautiously. The study of traditional architecture will be an important process because it will help architects to find an answer to design problems. When architects design the building, they should know they do this work for what, who, and how. Ancient architects and traditional architecture principles are precious instruction for present
designers. It is wisdom of ancient architects who made the foundation of architecture and constitute knowledge and directions of entire design elements.

Environmental ethics are theory and philosophy which educate people and provide reasons that why they should be cautious with the environment. The theory and philosophy also provide methods, such as rules, standards, and norms, which can be suggestions to people protecting the Earth for future generation. Recently, sustainable design has become a significant social issue on building design and economy for preserving environment and saving design budget. Environmental ethics are an essential consideration in architecture and design areas because architects and designers start to rationally consider why they should design sustainable buildings. The environmental theory enables architects and designers to gain a clear understand of environmental consideration and sustainable design principles with fundamental approach.

This research work suggests a new idea for designing environmentally responsible architecture. The idea was founded in traditional Asian architecture building design, Feng Shui. Even though some of Western culture considers Feng Shui as geomancy and a non-scientific design concept, this is not the case as many parts of Fegn Shui are proven by clear evidence. Feng Shui consists of valuable design principles and the elements have similarities with Western architecture theory. Energy efficiency and performance of sustainable design and Feng Shui can be studied for evaluate their similarities. The study will analyze similarities in HVAC Systems, Nature ventilation, Insulation, site selection, surrounding considerations, renewable energy sources, daylight, building site water management. The research analyzes sustainability in the traditional Korean home design,
called Han Oak. Analysis of Han Oak, such as definitions and shape, space elements and form, formations, dispositions, interior layout and design elements, give valuable information to apply Feng Shui in recent architecture design projects. The new suggestion of sustainable design in Western and Asian culture can provide useful results and suggest applicable ways to architects and designers who want fundamental goal of sustainable building construction.

**Discussion**

For the future research, one should find more application of Feng Shui to improve modern technological understanding of environment and sustainable design. Moreover, more scientific reasons of Feng Shui should be proven with research and be certified from sustainable evaluation systems. Architects and designers will face some problems applying the Asian traditional building design method to modern sustainable technology. Research and study for proving scientific evidence are necessary process of Feng Shui application. Endeavor of architects are required and they try to find sustainability of Feng Shui throughout all design principles.
References


USGBC. (2013, 10 18). Retrieved from LEED Rating System:

http://www.usgbc.org/leed/rating-systems


http://www.passivhaustagung.de/Passive_House_E/passivehouse.html