Master of Science in Architecture

A Study on Feng Shui's Environmental Benefits in the Different Types of Housing in Hong Kong

다양한 홍콩 주택 유형에서 풍수의 환경적 요인이 미치는 긍정적 효과 연구

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Abstract

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Ultimate reality can never be adequately described and comprehended through empirical data or through rational knowledge. Fritjof Capra stipulates that we understand the reality we live in to be one of infinite varieties, diversities and complexities. It is nearly impossible to completely understand the world through conceptual thinking. Consequently, Feng Shui and the likes have been shunned to have no significance when compared to other measureable and quantifiable theories, and hence deemed by many to offer no benefits environmentally with the exception of maybe some psychological reprieve. Feng Shui can offer several environmental benefits and detriments as well to a home when applied in certain environmental and site specific conditions. How it does though is not widely known and the majority only has a vague idea of what the specific Feng Shui principles even are.

Feng Shui has been around for three thousand years and was foundational in guiding the Chinese to build their built environment. It is a body of ancient wisdom

that recommends how and where housing should be built. It was formed through the observation of astronomical, natural and human phenomena. The principles followed by the Chinese are recognized to simply bring good luck but they are actually nuggets of wisdom passed down from generations that have been developed after long periods of intuitive and organic observations. This thesis makes the hypothesis that Feng Shui principles are a reflection of principles that were developed for human survival. It hypothesizes that as the natural environment was not understood the good practices that allowed one to prosper in the natural environment were instead recognized simply to be superstitious "lucky" principles.

The Feng Shui quality of a home is an important factor to a prospective buyer even in metropolitan Hong Kong which is considered one of the most advanced and developed cities in the world. Despite the city being under British rule for more than 150 years and being westernized in many aspects many Hong Kong consumers including those from the mainland value Feng Shui principles. Many important skyscrapers in Hong Kong embody Feng Shui elements that people are not aware of and many of their characteristics have stories behind their design that were based on the recommendations of Feng Shui masters. Large corporations recognize the value the Chinese place on Feng Shui and have made steps in their office buildings to embody Feng Shui principles in order to boost the morale of the workers.

It is known among the Chinese that Feng Shui is not only about getting as much 'qi' (energy) and hence receiving good luck holistically in their lives but understand that it is about living in harmony with the surroundings. Hence, far from common misunderstanding many in the East as well as the West are aware of Feng Shui's environmental benefits. However, many do not recognize that some Feng Shui principles offer no environmental benefits at all, in fact some cause more harm than good. Many consumers in fact place little importance on the environmental conditions but only concentrate on the number of Feng Shui elements of a home. This is problematic as the environmental benefits are overlooked and Feng Shui elements that may offer no benefit at all are blindly chased after. It is imperative that the environmental implications of each Feng Shui principle are understood.

This study aims to show what environmental benefits Feng Shui principles can offer in the context of Hong Kong in the three main types of housing, Residential Towers, Public Housing and Villas. Through this study it will become clear in which types of housing Feng Shui elements offer the most environmental benefits and the readers will be able to understand the underlying reasons. It is imperative that the potential of Feng Shui is understood fully so that they can be utilized effectively.

Keywords: Feng Shui, Hong Kong Housing, Environmental Implications of Chinese Mysticism, Feng Shui's Parallelism with Sustainable Design
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Figure 0-1 Victoria Harbor front, Hong Kong

Source: Author

1. Introduction

1.1 Preface

There has been a growing interest in the subject of Feng Shui in recent years worldwide. This interest has been fueled also by the growing interest in environmental protection. As globalization accelerates more eastern influences have entered the west along with the study of Feng Shui. Feng Shui is a contemporary word that is used however; its original traditional term is "Kan Yu". "Kan" refers to the observation of the sky and climate and "Yu" refers to the observation of the geography.[1] Feng Shui has always been about achieving parallelism with the environment and its principles naturally allow a building to be in harmony with its surroundings. The principal philosophy that has influenced Chinese thought and culture is to have originated from Emperor Fu Xi's book "Yijing: The book of changes" written in 3322 B.C.[2] The book delves in to understanding how we relate to the cosmos and our surroundings and Feng Shui was derived from this principle. With global increasing interest in understanding how we can live without damaging the nature around us the Feng Shui can be seen to be a potential topic of interest in the decades and the generations to come.

There are currently more than ten thousand sites on Feng Shui on the internet and many books and other forms of media have been published over the years that delve on subjects ranging from interior design, illustrated guides to books that tried to bridge the gap between popular and serious Feng Shui.[3] There is a wealth of Feng Shui knowledge that is available and its presence is strongly felt in the information

[1] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, xxvii.
[2] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 27.
[3] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 2.

world today. However, the gap between popular Feng Shui and serious Feng Shui still exists and the more fun and appealing principles are more popularly known among the communities around the globe. It is usually the quirky and eccentric principles that have been originated from the study that gained most of the attention and hence unfortunately more commonly practiced.

Feng Shui is also becoming an important industry as its commercial value is starting to be recognized. Feng Shui in the west has become commercially orientated. Almost all of the thousands of websites that come under the search string "Feng Shui" are indicative of being commercial venture websites.[4] There are apparently few sites that are supported by non-profit or educational organizations and hundreds are practicing as consultants.[5] This is problematic as people are seen to be acting as consultants without having a full knowledge of the study and many of the recommendations clients are receiving advice can be presumed to be not all legitimate. Due the dissemination of groundless and valueless Feng Shui principles they become mere superstition that is used simply for "good fortune" in the lives and the businesses of individuals as they are commonly used for today.[6]

[4] Mills, "Western Responses to Feng Shui.", 74.
[5] Ibid., 74.
[6] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 27.

1.2 Feng Shui in Hong Kong

Feng Shui is not an unknown body of study in Hong Kong, in fact Hong Kong is if not the most Feng Shui integrated city in the world. It is an exceptional Chinese city that was untouched by the cultural revolution of the 1966 as the city was under British rule. It did not face too much damage either by the Japanese after its relatively quick surrender to the offensive forces in December 1941.[7] Despite western influences Feng Shui has been an integral aspect of the city's architecture especially. It surprises many to find out how much Feng Shui has and is embraced by Hong Kong's architecture and how eagerly they are sought after by the market.

Figure 1-1 View from Central Library, Hong Kong

Source: Author

[7] "Hong Kong Museum of History - Gallery07."

Today around 35% of Hong Kong people is to believe in Feng Shui practices and surprisingly in the city the more educated a person was he or she was more likely to be a believer of Feng Shui in the city.[8] Among those who were not educated 25% said that they believed in Feng Shui whereas 42% of those who were educated said that they believed in it.[9] In the cited study "educated" means to have obtained a college degree. Demographically a similar percentage of around 30% believed in Feng Shui with the exception of those who were under 18 where the percentage who believed hovered around 25%. [10] Emmons, who stated these findings, proposed that this was because individuals started to become concerned about one's luck as he or she moved in to young adulthood. This is understandable as one gets married and gets older there are more responsibilities that are bestowed upon him or her.

A study done on the consumer's view of Feng Shui led by Chung Luk show that consumers in Hong Kong and Singapore hold three view towards Feng Shui which comprise of instrumental, spiritual and minimalist. The study works on Tsang's work of conducting a survey on 53 businessmen from Singapore or Hong Kong that sought to find out how many of them consulted Feng Shui masters.[11] Luk's study identifies that consumers who viewed Feng Shui as instrumental believed that it affected one's luck and fortune, consumers who viewed it as spiritual viewed it as way of guiding one's spiritual life and cultural identity and consumers who viewed it as minimalist viewed it as mere superstition. As expected the study concludes that those believed Feng Shui to be instrumental in their lives responded favorably to Feng Shui services and products more than those who had spiritualistic views towards the study. However, the study recommends simple integration of its

[8] Emmons, "Hong Kong's Feng Shui: Popular Magic in a Modern Urban Setting.", 42.
[9] Ibid., 42.
[10] Ibid., 41.
[11] Tsang, "Toward a Scientific Inquiry into Superstitious Business Decision-Making.", 923.

principles including for aesthetic uses can help lure consumers who hold this view to consumer more of Feng Shui products and services.[12]

Figure 1-2 The Repulse Bay Building, Hong Kong

Source: Wing (2015) [13]

There are interesting buildings in Hong Kong that had its overall forms dictated by the principles of Feng Shui. The Repulse Bay building is a good example. Land is scarce in Hong Kong and every square foot of space is precious and developers as well as consumers alike understand this dire situation that exists in Hong Kong. Hence, most buildings take a regular shape with every floor filled in order to maximize the floor space of a single flat. However, when it comes to Feng Shui space becomes second priority as what's the point of constructing space efficient flats when they are not demanded by the market? Feng Shui is a very sensitive issue in Hong Kong although many do not believe this is true. In Hong Kong if a house's Feng Shui is affected by a public construction project the owners can claim

[12] Luk, "Consumers' Views of Feng Shui: Antecedents and Behavioral Consequences.", 499.
[13] Wing, "The Repulse Bay Overview."

compensation from the government. The Hong Kong government is to have compensated 7.7 million US dollars to compensate people for having their Feng Shui's in their homes disturbed.[14] Disruptions could comprise of houses being covered by overshadowing construction panels, placement of sharp objects within the houses' vicinity and the polluted environment. However, this has become controversial and guidelines are to have been promised to be set up. The government is to have kept no compensation records for the millions that have been distributed to those affected.[15]

The Repulse Bay building is a residential and commercial arcade and is an example of a building that had its form dictated by Feng Shui. The big hole that makes the form of the building is called a "dragon gate". It supposedly allows the dragons to fly from the mountains to the sea and get water every day.[16] If the buildings acts an obstacle for the "dragon" to go down to get water it is to bring "misfortune". This is a specific principle applied to only certain cases and is not a common Feng Shui principle. The practice has its dark side too given that it is a subjective art.[17] This Feng Shui principle does not apply in every case but in specific cases and it is usually done with the guidance of a Feng Shui master. This is an exemplary of the cases that exist in Hong Kong; Feng Shui is a very important factor that is considered during the construction and purchasing processes of buildings.

The paper "Hong Kong's Feng Shui: Popular magic in a modern urban setting" written by Charles Emmons gives further insight of the value of Feng Shui in the city. One 37 year old man is recorded to have said "Only rich people can afford to believe in Feng Shui. It's a rich people's game". He is to have complained of how the resettlement buildings are alike and it is very difficult to change the direction of homes. The rich in Hong Kong is to have greater resources and greater incentives to use Feng Shui. When a physical remodeling or rearranging actions were taken it was found that ten out of twelve businesses called in a Feng Shui expert whereas

[14] Moore, "Hong Kong Government Spends Millions on Feng Shui."
[15] Ibid.
[16] "Here's Why Hong Kong Skyscrapers Have Holes - Business Insider."
[17] Moore, "Hong Kong Government Spends Millions on Feng Shui."

twelve out of twenty four individuals or families used one. However, the majority did not consult a Feng Shui master.[18]

Figure 1-3 View of Apartments across the Shatin River

Source: Author

Many prominent buildings such as banks involve Feng Shui in to their design. The Hong Kong and Shanghai bank had its triangular structural elements inverted on the outside as sharp edges of a building in Feng Shui have a negative Feng Shui effect on other buildings. The bank towered over its competitor Bank of China which was situated nearby. However, a new building for the Bank of China was built. 70 floors high it was a large building and towered over the surrounding buildings. However, it was controversial as its façade was covered with triangular structures which were a bad Feng Shui principle. This caused the HSBC which was built after to be built with two cannons pointing towards the Bank of China to counter this bad Feng Shui design. Feng Shui has a long history in Hong Kong.[19]

[18] Emmons, "Hong Kong's Feng Shui: Popular Magic in a Modern Urban Setting. ", 42.
[19] Ibid., 44.

1.2.1 What is Feng Shui?

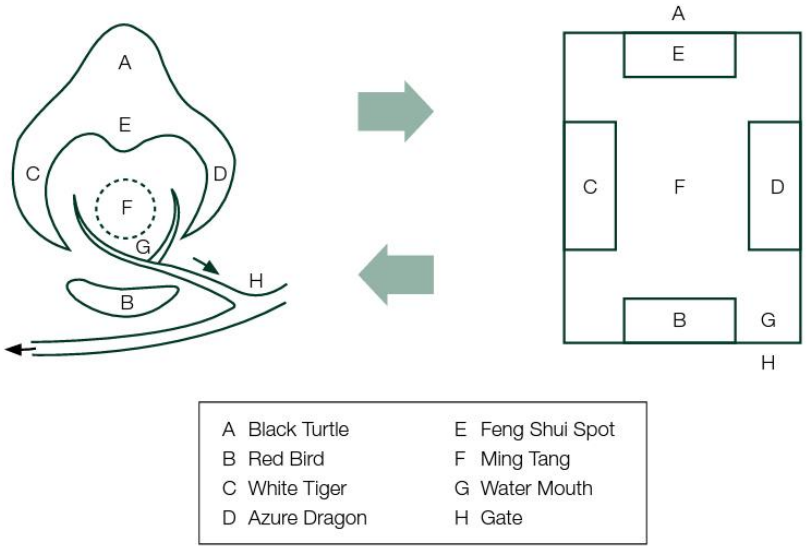


Figure 1-4 Correspondence of the Four Emblems in Nature and Architecture

Source: Mak and So (2015) [20]

Feng Shui is defined as a 'Chinese philosophical system of harmonizing everyone with the surrounding environment'. Feng Shui understands architecture to be something that is bound with the universe, earth and humanity by 'invisible forces'. Feng Shui was historically used to orient buildings so the buildings can be built on auspicious locations. Feng Shui has and is not only being used for buildings but also to orient 'significant structures such as tombs and other structures'. 'Auspicious' sites were determined in references to the bodies of water, stars of the site and with the compass. Feng Shui was suppressed briefly during the Cultural Revolution in the 1960s however; it has always been an important fabric of Chinese culture. There are two main schools of thought for Feng Shui and they comprise of Form School and Compass School. The Form School is older and is mentioned in the 'Book of the Tomb' during the Han Dynasty and 'The Book of Burial' during the Jin dynasty.

[20] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 103.

Unsurprisingly the form school is concerned with the location and orientation of tombs initially then the school moved on to consider homes and other buildings. The Form School of thought looks in to the shape of the location, such as the mountains, rivers, plateaus and tries to find an ideal site for the house. The School considers the five celestial animals which comprise of the phoenix, green dragon, white tiger, black turtle, and the yellow snake as well as the five elements that comprise of wood, fire, earth, metal and water.[21]

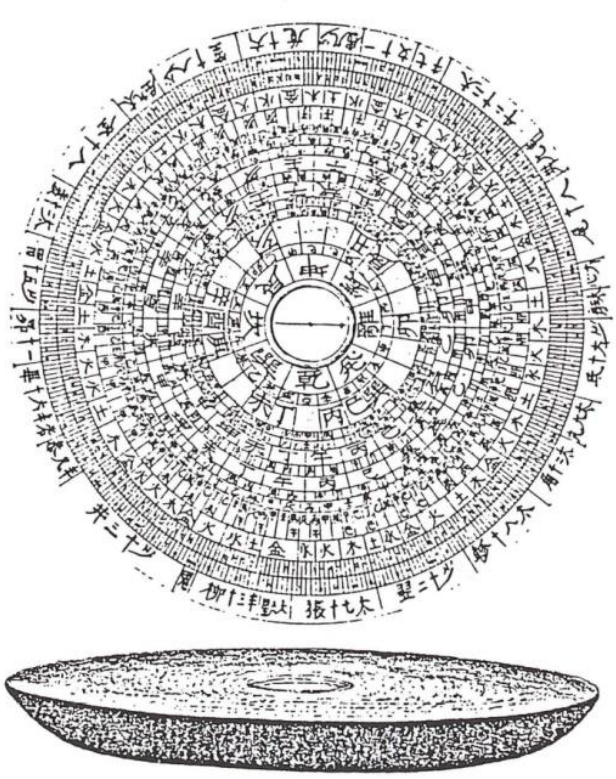


Figure 1-5 Feng Shui Compass

Source: Mak and So (2015) [22]

[21] "Feng Shui - Wikipedia."
[22] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 30.

The Compass school on the other hand uses a Feng Shui compass that is called a Luo Pan which is "a bowl that contains all mysterious of the Universe"[23] The Compass School employs three main theories which are the Yin-Yang theory, the theory of Five elements and the Lo-Shu Square. The Yin-Yang theory is about balancing the two Feng Shui forces Yin (feminine) and Yang (masculine) to achieve harmony. Architecturally Yin represents the calm colors that exhibits passive energy and Yang represents the vibrant colors that exhibits active energy. This is where the five elements come in architecture and their colors are incorporated accordingly to achieve a balance in a house.

The Compass school is really about making sure that the house is designed in a way that certain programmatic spaces of the house face certain directions. It also concerns itself with the calculation of 'lucky directions' or the most 'auspicious energies' based on a client's date of birth. Despite the existence of these two schools till the late nineteenth century they merged together to form one school.[24]

Figure 1-6 Loess plateau in Linxia County, Gansu

Source: Vmenkov (2009) [25]

[23] "Compass Feng Shui School of Thought."
[24] "Compass Feng Shui School of Thought."
[25] "5902-Linxia-County-Xihe-Township-Canyon - Loess Plateau - Wikipedia."

Feng Shui is speculated to have been originated from the Loess Plateau in ancient China and it is to have been developed from the art of ancestor worship and grave site selection. However Michael Mak contends that Feng Shui was instead developed from the art of selecting a "comfortable dwelling house". An etymology study of the current term for an auspicious site is 'Xue' which means cave in Chinese. However in Chinese the original term for cave is to mean "earthen cave-dwelling". Hence the meaning of 'auspicious site' which is mentioned in the Feng Shui context can be seen to not only be talking about a site which is 'auspicious' as many people recognize today but as a site appropriate for dwelling. Feng Shui can be seen to have had a similar history of where its real meaning was altered over the years and lost its original intended purpose.[26]

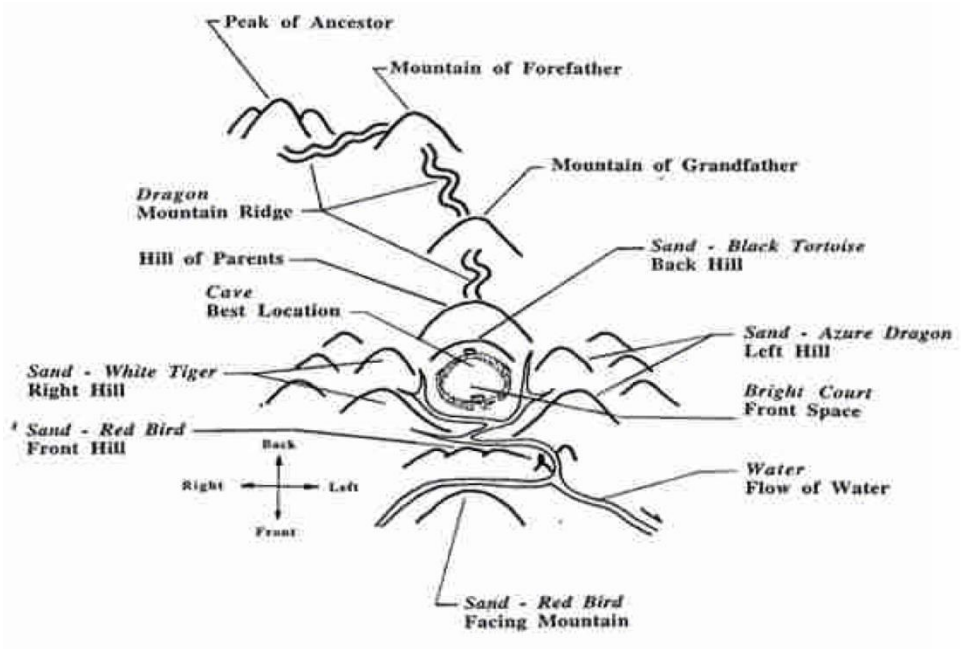


Figure 1-7 Ideal Feng Shui Model

Source: Yi et al. (1996) [27]

[26] Mak and So, *Research in Scientific Feng Shui and the Built Environment*, 103.
[27] Yi and Hong, *Geomancy and the Selection of Architecture Placement in Ancient China*.

In Feng Shui there is this concept of parallelism where a building is considered not only as an architectural object but also as a cosmic structure. Hence, when designing a building it should be designed in parallel to the 'cosmic realm'. There are four quadrants in the celestial sphere and they comprise of Azure dragon, Red bird, White tiger and Black tortoise. What's interesting is that these quadrants are identified as East, South, West and North respectively. Hence, when choosing a site the Feng Shui master will recommend a site that is in parallel with the 'cosmic structure'.[28]

Above is a diagram showing the mountains adjacent to the site recommended by Feng Shui and it can be seen that the mountains represent the cosmic structure. What's more interesting is that this cosmic structure can be applied to the interior layout as well. The diagram below shows that the four emblems which comprise of the black turtle, red bird, white tiger and the azure dragon are represented can be designed to surround the Ming Tang which is a bright hall where most of the 'qi energy' is gathered. However, there are problems that exist with contemporary Feng Shui that will be mentioned in the next section. There are aspects of accepted Feng Shui of today that is tainted with fallacy and offer no environmental benefits.[29]

[28] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 27-28.
[29] Mak and Ng, *Feng Shui: A Chinese Approach to Integrated Design*, 131.

1.2.2 Problems with Contemporary Feng Shui

Figure 1-8 HSBC Building, Hong Kong

Source: Alan Mak (2004) [30]

Feng Shui has become in the minds of many people something that is mere superstition that has little scientific or cultural basis. Especially in Hong Kong, given the examples shown below Feng Shui could even be presumed to be an area of abuse as buildings take additions and design characters that seem completely unnecessary. Whether one realizes or not there are a lot of buildings in Hong Kong that incorporated elements that if viewed without understanding will seem illogical. However, architects do consult with Feng Shui masters to understand what changes need to be made. The underlying reason for the of consulting Feng Shui masters prior construction can be seen to range from the desire to achieve marketability to fill one's superstitious appetite. However, this can be seen as a problem as extreme elements are added and people's understanding of what Feng Shui originally

[30] "HK HSBC Building - HSBC Building (Hong Kong) - Wikipedia."

intended to achieve in the past becomes even vaguer. Some examples in Hong Kong that show how Feng Shui is being incorporated can be seen in the skyscrapers that are stand over the Victoria harbor.[31]

In the HSBC Main building two model canons were built to defend the building from negative energy that is apparently flowing from the Bank of China Building that is nearby. Feng Shui masters believe that the Bank of China building is giving out negative energy because of its sharp edges. The HSBC Main building is to have also had its escalators designed in a way that will apparently according to the Feng Shui masters bring prosperity to the business as well. The Repulse Bay Hotel on the other hand had large holes carved in to the building to apparently allow dragons to fly through and achieve good Feng Shui in the building. Hence, it would not be so surprising to see the common person to view Feng Shui to be full of superstition that has no cultural or scientific basis.[32]

These excessive calls for amendments in designs which in essence have no real value can be seen to be the result of greed and the lack of restraint on the scholarly body of Feng Shui. However, it would not be wrong either to understand this may be due to the failure of many Feng Shui scholars to understand what its initial focus was which was of being in harmony with the environment and being parallel with the surroundings. Not all Feng Shui principles have no environmental value but if homes are built in mind with the more known and practiced core principles of Feng Shui more environmental benefits could be reaped. It would not be wrong to say that the recommendations made by the Feng Shui masters today have moved from the original principles, most likely as people's perception and expectations have changed over the centuries. Illogical and unordinary measures can be seen to be more marketable than mundane and rational measures and hence more sough after.

[31] "Feng Shui Myths of HK."
[32] "Feng Shui Myths of Hong Kong Landmarks."

1.3 Feng Shui's Environmental Implications

In 1990s there was a worldwide increase in the awareness of the crucial role the environment played and the need to protect it. The focus on Feng Shui changed as well and it's ecological and functional effect on the landscape began to become recognized by the research communities[33]. The application of Feng Shui allowed effective utilization of sunlight, protection from wind, the habitation of well drained sites, and allowed a building to be within convenient reach of water sources[34]. Hence, now there is more study being done on the environmental benefits of Feng Shui and many scholars are highlighting the environmental edge Feng Shui's gives. This section aims to give an overview of what researches have been done regarding the environmental implications of Feng Shui and also given an insight of how this paper will try to understand its effect in the context of Hong Kong's housing.

Feng Shui as mentioned previously is about making sure that the people live in harmony with the environment. The study aligns construction with the environment which makes enables its principles to abide with green building principles recognized by today's scientific community[35].

[33] Chen and Nakama, "A Summary of Research History on Chinese Feng-Shui and Application of Feng-Shui Principles to Environmental Issues.", 299.
[34] Ibid.
[35] Bo, "Traditional Feng Shui Architecture as an Inspiration for the Development of Green Buildings.", 70.

1.3.1 Architectural Implications

There are similarities and differences when the principles of Green Design and Feng Shui are compared but they share more common traits. To achieve Feng Shui three areas are considered which comprise of the Universe, Earth and the human factor. These three areas are almost parallel to the three areas that are considered in Green design which comprise of Social context, environment and the human factor. As Mak's paper states "The Feng Shui concepts of Form School model and balance between interior and exterior spaces are focused on the physical form and spatial arrangement of the built environment".[36]

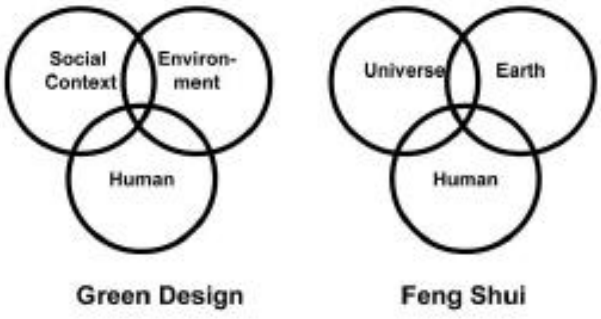


Figure 1-9 Comparison of Green Design and Feng Shui Principles

Source: Dong et al. (2009)[37]

Chan in his paper "Green design related to Feng Shui Issues in Taiwan" tried to understand the connection between sustainable design and Feng Shui by going directly to the experts of Feng Shui for their opinions. The Taiwanese government has a nine-indicator system for green buildings and these indicators comprise of Biodiversity, Green planting, Water retention on site, Energy savings, Carbon dioxide emissions, waste reductions, indoor environmental quality, water resources and garbage & sewage. Six Feng Shui experts were asked whether they agreed

[36] Mak and Ge, "Sustainable Design and Feng Shui: A Case Study of an Office Building in Sydney.", 88-89.
[37] Mak and So, *Research in Scientific Feng Shui and the Built Environment*, 201.

which of the mentioned indicators they believed Feng Shui allowed buildings to achieve. Many of the experts believed that Feng Shui helped a building to achieve most of the indicators. The results were that all the experts agreed that Feng Shui allowed buildings to achieve biodiversity environment, green planting, water retention, energy savings, water resources and garbage and sewers indicators. Only one expert however believed that Feng Shui allowed building to reduce waste and there were discrepancies among the experts' views when it came to the indicators regarding carbon dioxide emissions and indoor environmental quality.[38]

1.3.2 Site Implications

"Heaven requires the aid of man to carry out its scheme of justice. Earth requires the aid of man to bring its products to absolute perfection. Neither heaven nor earth are complete in themselves, but leave the last finish of everything to man. Consequently, as regards the natural outlines of the earth's surface, there is much room left to the active interference of man."[39] This statement found in Eitel's work "Feng Shui" (cited in Yong 1988) shows that Feng Shui believes that active interference, that is dwelling is needed for the environment to thrive as well as long as this is done properly. Surprisingly, there is a strong correlation between Feng Shui and sustainable design when it comes to orientating and positioning a building.

Zhou Yi talks about the importance of stopping before going too far especially in China where it has diverse climates and surroundings. The north west of China is dry hence the people have lived in caves in that area whereas the southwest is humid which led to residential suspended bamboo buildings. Mongolians on the other hand live in portable housing that is tents so they can migrate easily and

[38] Chan, "Green Building Design Related to Feng Shui Issues in Taiwan.", 22-23.
[39] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 28.

people of Guizhou and Dali live in masonry houses as the area is mountainous. The people live according to the local conditions.[40]

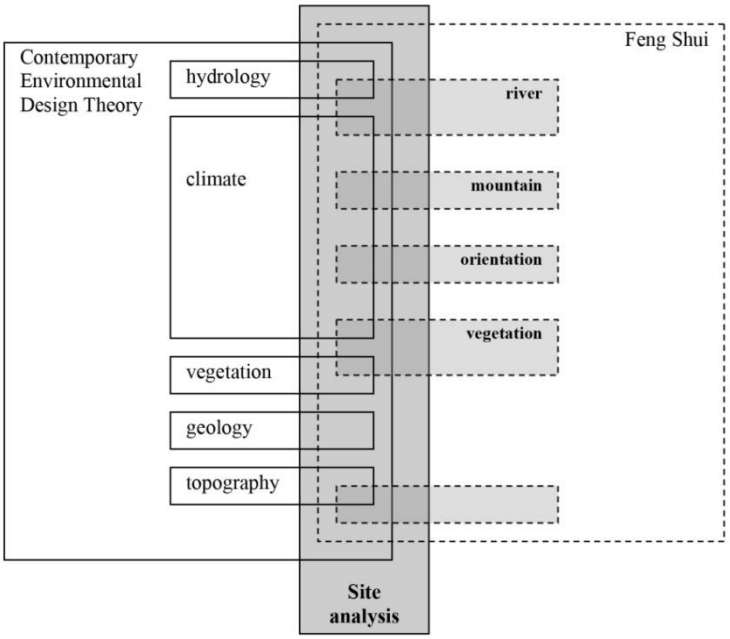


Figure 1-10 Comparison between Feng Shui and Environmental Design Principles

Source: Xu (2003) [41]

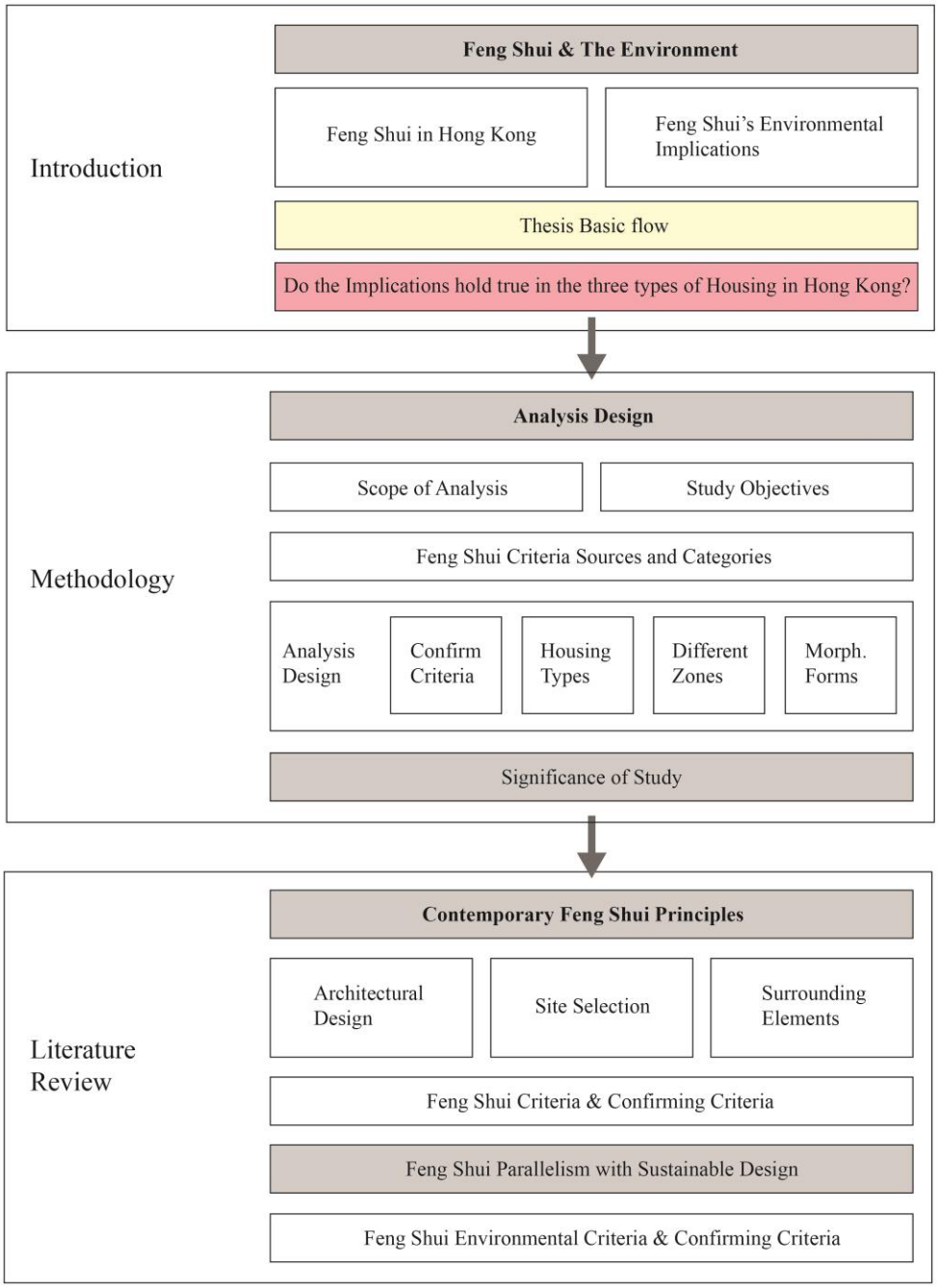
About is a diagram showing the relationship between the Feng Shui and environmental design principles when it comes to the site. It can be seen that as Feng Shui principles that deals with the desired conditions regarding the mountains and orientation, the climate part of sustainability is dealt with whereas river deals with hydrology and climate. However, it is interesting to note that the geology and topography is not dealt by Feng Shui although these two are also important sustainability topics. Feng Shui is a study that examines the sites of cities[42].

[40] Bo, "Traditional Feng Shui Architecture as an Inspiration for the Development of Green Buildings.", 71.
[41] Xu, "A Framework for Site Analysis With Emphasis on Feng Shui and Contemporary Environmental Design Principles.", 26.
[42] Ibid., 25.

In Mak's and Ge's paper "A study of modern sustainable buildings in Sydney from the Feng Shui perspective" office designs were assessed with the Feng Shui assessment as well as the Green star certified assessment. The correlation coefficient allows one to understand the degree of relationship between the two. Mak and Ge found out that the correlation coefficient is 0.857 when 31 projects were analyzed. This shows that there is a positive correlation between Feng Shui and green design at least in the case studies in Australia that were studied. From these findings the authors conclude that Feng Shui concepts can be applied in modern buildings and will allow them to be more sustainable and be less harmful to the surrounding environment. The mean green star score of 4 star, 5 star and 6 star buildings were 51.7, 63.6 and 82.1 respectively and achieved 4.8, 6.2 and 8.1 in Feng Shui points respectively.[43]

[43] Xu, "A Framework for Site Analysis With Emphasis on Feng Shui and Contemporary Environmental Design Principles.", 25.

1.4 Thesis Basic Flow



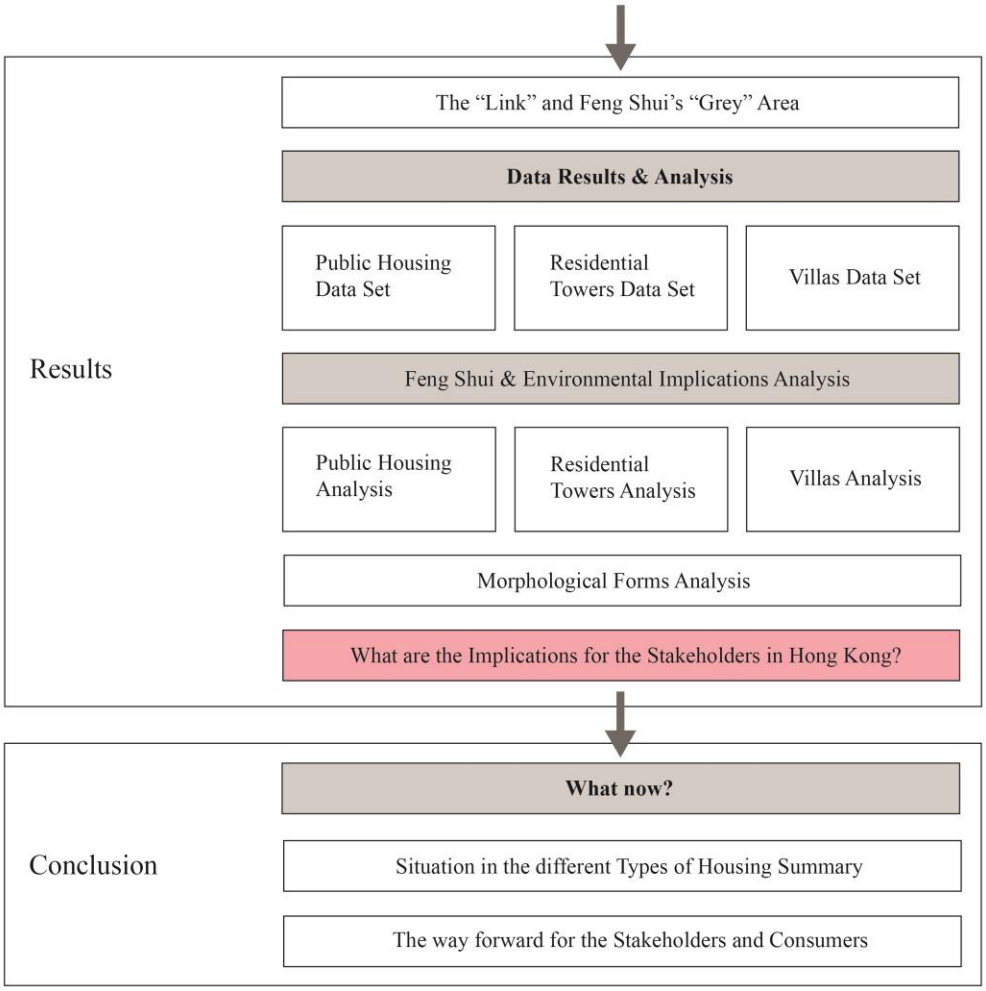


Figure 1-11 Thesis Basic Flow

2. Methodology

2.1 Scope of Analysis

As the title of the thesis indicates the scope of study will be limited to Hong Kong SAR (Special administrative region). The thesis will look at three types of housing which comprise of residential towers, public housing and villas. The dataset was obtained through property company sites such as Midland and the most demanded property apartment complexes were chosen to be studied in this thesis. The source citation is cited in this sentence.[44] Not all the apartment complexes that exist in Hong Kong were looked in to and they are laid out in the Results chapter. Other forms of houses such as village homes were not included in the study.

The analysis done to determine whether a flat obeys certain Feng Shui principles is fairly accurate however, although specifications were assumed to measure whether in the specific flat conditions the environmental implications hold true the degree of accuracy in this area is limited. Real time simulations are needed to achieve a high degree of accuracy. In this study regardless, it is shows us a strong indication of how effective these Feng Shui principles in the specific contexts are and helps us to understand the situation in Hong Kong.

[44] "Midland Realty - 16Yrs Transaction History."

2.2 Study Objectives

The purpose of this study is to understand first of all how Feng Shui principles differ in their application, intentional or not in residential towers, public housing and villas and in the different zones of Hong Kong. Hong Kong is divided in to three zones; Hong Kong Island, Kowloon and the New Territories. How many principles in average they have been used, and if used the question is in which overarching category and category of Feng Shui was more present. The design intentions and objectives of each type of building differ not only because they are built by organizations which have been established for different purposes but because the purpose of these different types of buildings differ in essence. From then the environmental implications of each Feng Shui and whether they hold true in each of the housing dataset acquired will be looked in to. Again how this differs among the different housing types, zones of Hong Kong and so on. The study will also look in to the effect Feng Shui has on the housing prices as well which will not only give an indication of not only how much Feng Shui is demanded by the market but also give an indication of how much of scholarly accepted and recognized Feng Shui is really known by the consumers of Hong Kong.

2.3 Analysis Design

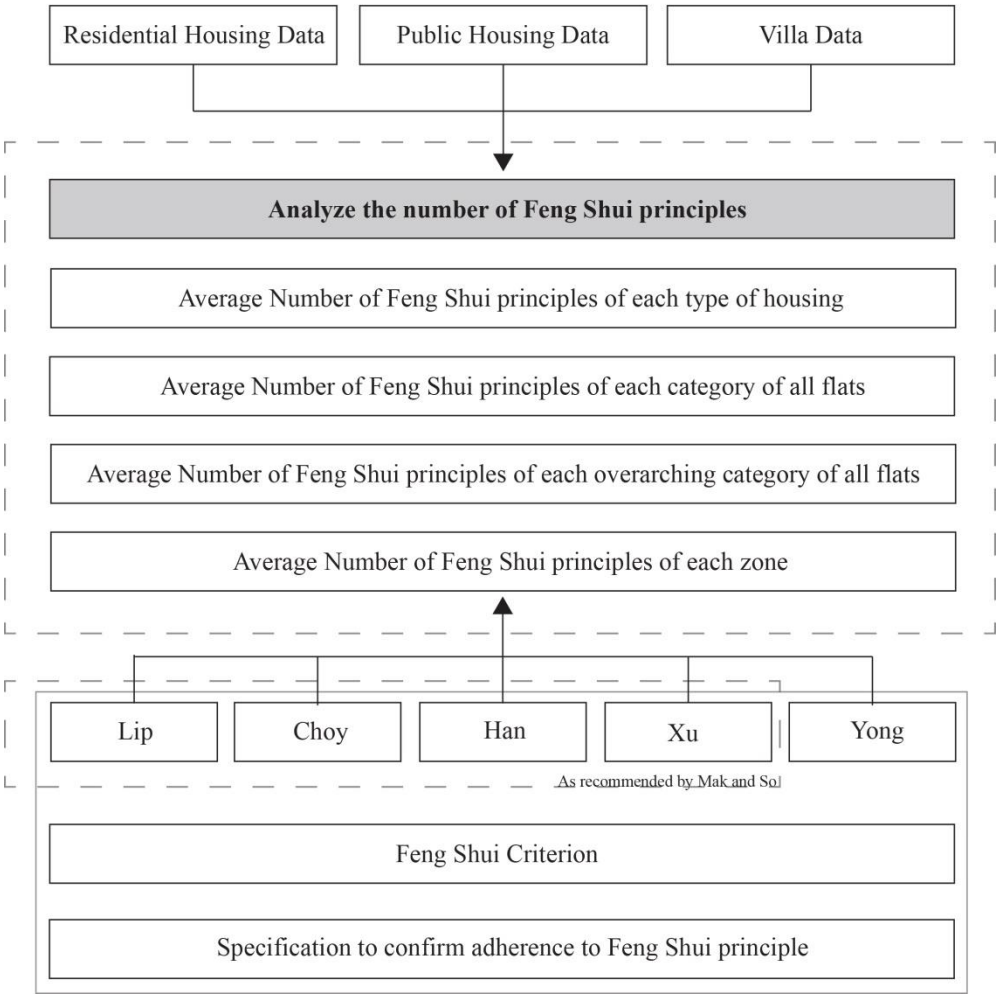


Figure 2-1 Methodology to analyze the number of Feng Shui principles

Dr. Evelyn Lip	Choy H	Ke-Tsung Han
Listed a set of standard rules of thumb for assessment of architectural design. 13 Books on Feng Shui. Her design rules-of-thumb followed the Form School approach that are based on the information obtained from ancient Feng Shui texts, such as Yang Zhai Shi Shu (Ten Books on Dwellings of Living) and Shui Long Jing (Water Dragon Classic).	Has written design checkpoints for architectural design with Michael Mak. He is the publisher of "Go with the flow", a Residential property investors guide and Introductory notes on Feng Shui (Mak, Choy 2007). Choy advises that the ultimate Feng Shui principles allow energy to to be balanced.	Han in his study of Feng Shui as a Chinese concept of the environmental studies, suggested 24 major criteria for the selection of the best Feng Shui location. Ke-Tsung Han is a professor at the National Chin-yi University of Technology in Taiwan.

Xu Ping	Teh Tien Yong
Xu (1990) in her Feng Shui landscape model derived the procedures for dealing with land formations. Her dissertation submitted to the Harvard Graduate School of Design was on Feng Shui: A model for landscape analysis.	Teh Tien Yong is a partner of Design International Architects (Singapore). He has more than 28 years of experience in the field of planning, urban design, architecture, conservation, landscape and interiors. His career began in the Urban Redevelopment Authority of Singapore as a graduate. He wrote his paper on Feng Shui in 1988.

Table 2-1 The Five Contemporary Feng Shui Scholars

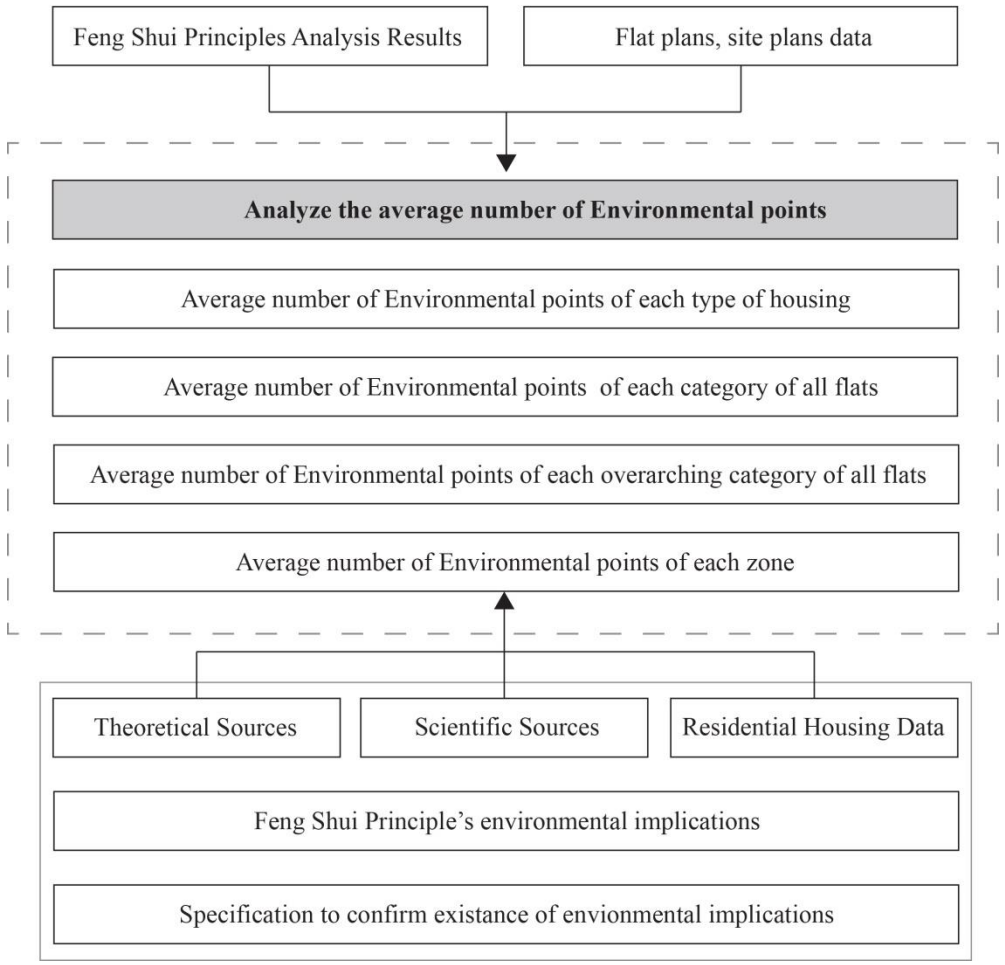


Figure 2-2 Methodology to analyze the Average number of Environmental points

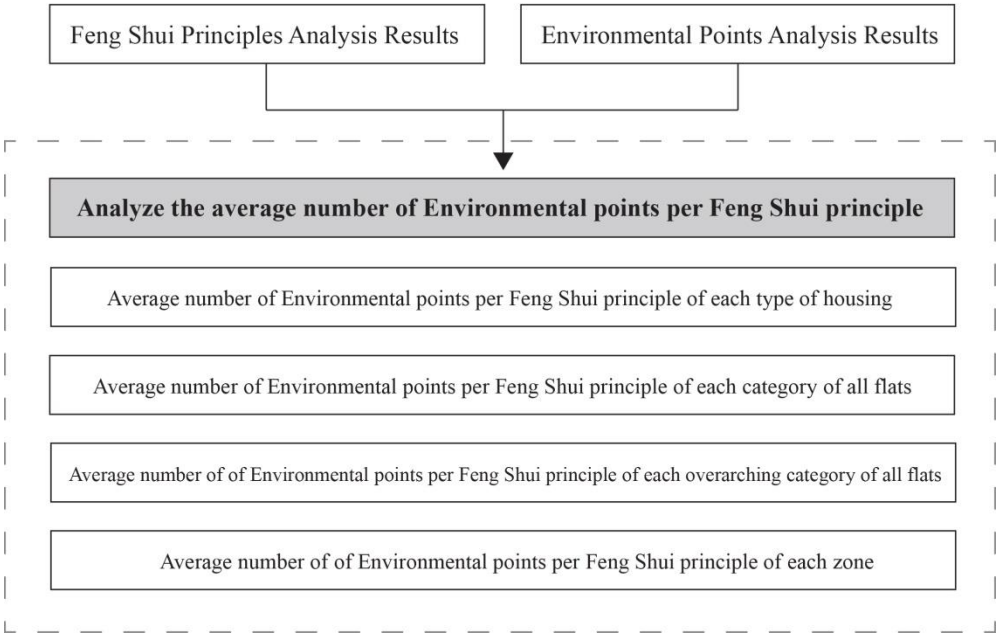


Figure 2-3 Methodology to analyze the number of Environmental points per Feng Shui principle

2.4 Significance of Study

Four example papers which analyze Feng Shui and its environmental implications were looked at. Through this research, adjustments to the theory part of how Feng Shui principles were related to the environmental implications were made. The papers' aim, approach and details have been summarized in to a table. The first resource by Chang was pivotal in inspiring this thesis paper. It aims to quantify Feng Shui principles that exist in Korean homes and see which types achieve more Feng Shui elements than other types. In the second resource Mak went through each of the village houses in Hong Kong and analyzed how they fulfilled the Feng Shui principles. It differed from the thesis study as it did not analyze the Feng Shui principles through a detailed specification. The third resource did in-depth case studies of several apartments. It analyzed how each case the Feng Shui principle was correspondent with the respective environmental benefits and implications. It also explained the bridge that exists between Feng Shui and the environment. These resources were useful as it approached in detail of how the principles are applied. Through the literature review it was possible to clarify the purpose of this study.

Title	Authors	Approach & aim	Similarities/ Differences
Quantification of Feng-Shui Principles in the Design of Korean Houses	Dongkuk Chang, Kyongwon Kim, Joohee Park and Backyong Kim	Quantification and tallying approach, space syntax of spaces to understand which types of housing in Korea have more Feng Shui elements	Feng Shui principles are quantified but this thesis goes a step further and looks at the Feng Shui elements and the environmental implications

Average	Traditional Korean houses	Contemporary Korean style houses	Contemporary architects' houses
Total	35.00	33.25	26.50
Exterior	17.00	13.25	12.00
Interior	18.00	20.00	14.50

Table 2-2 Feng Shui scores of the three types of Korean houses

Source: Chang et al. (2014) [45]

Feng Shui villages in Hong Kong: A case study of Tai Fu Tai mansion	Michael Mak	Looks at each village home methodologically and looks at its history and Feng Shui principles. It concentrates on the interior and home elements such as furniture	Does a deeper analysis of each home by looking at each element meticulously but differs in that comparison between the village homes are not made possible and not done
Purchasing family homes: Feng Shui versus sustainability	Xin Janet Ge, Michael Mak	Looks at three case studies and does a direct comparison of Feng Shui elements and the environmental implications	The environmental benefits of each specific Feng Shui element of each specific case is observed.

[45] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 7.

3. Literature Review

3.1 Contemporary Feng Shui Principles

The principles of the Form school will be the focus of this study not the Compass school as it deals with the architectural aspects of a building and as it is much better known among the scholars and communities of today. The compass school on the other hand deals mainly on the orientation and is only a small aspect of Feng Shui. Form School is to have started with Yang Yunsong and Zeng Wendi of Kanchou whose study was refined by Lai Dayu and Xie Zhuyi[46]. The form school emphasizes on terrain, orientation and architectural dimensions, elements and surrounding features[47]. It is almost identical to how aspects of the site and the building's design are considered to achieve sustainability prior to construction although in Feng Shui the main objective is to allow qi that is good energy to enter the house and hence achieve good luck and well-being for the inhabitants. Contemporary scholars such as Dr Evelyn Lip and Xu Ping agree that the Form School is the "most dominant approach in Feng Shui practice" when it comes to the built environment[48]

As recognized by He Xiao Xin the basic idea of Feng Shui is that human events and natural processes whether it be terrestrial or celestial are connected and hence being in an area where is there is a lot of energy as known as qi in Chinese is considered to be a way to make sure the human events of an individual goes smoothly. In the Form School there is something called the 'Five Feng Shui Geographical secrets" which is laid out in the book Di Li Wu Jue (The Five Feng Shui Geographical secrets) and these secrets comprise of dragon, sand, water, cave, and direction.

[46] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 28.
[47] Ibid.
[48] Mak and So, *Research in Scientific Feng Shui and the Built Environment*, 78.

These are the secrets that are looked out for when constructing a building in Feng Shui. The first secret is to seek the dragon. This is about looking for mountain ridges that are referred as dragons or dragon veins. A mountain that is a considered to have the characteristics of a dragon has a peak and a long ridge that becomes smaller in height just like a dragon. The more distinct this is the better. The Qi energy is believed in Feng Shui to flow on the vein of the dragon.[49]

The Sand is an important element and this is talking about the subject of soil and is symbolic of protecting a house from strong winds. Water on the other hand is about the principle of buildings facing a water source whether this is a stream, river, lake or sea. A watercourse is to "represent the physical and visible flow of Qi". In Feng Shui Qi is to come and is accumulated by water. The fourth secret is the cave and this secret is called Xue in Chinese which literally means pit or spot in Chinese. This is about spotting the Feng Shui spot of the site, that is finding the best location for the building in the site. Finally there is direction where the orientation of a building is determined and the best direction to face is south[50]

Various Feng Shui scholars were introduced by Michael Mak and Albert So in their book Scientific Feng Shui for the built environment[51]. Based on the four scholars as laid out in their book and one scholar through research the Feng Shui principles were compiled. The scholars comprise of Dr Evelyn Lip, Howard Choy, Ke-Tsung Han, Xu Ping and The Tien Yong. Lip and Choy deal with Architectural design, Han and Xu deal with Site site selection and Yong deals with surrounding elements. They do cross over in many areas but predominantly focus on the mentioned areas. By merging their thoughts on the principles of Feng Shui a comprehensive Feng Shui criteria table is presented in the thesis. Several of these principles are common knowledge to the Hong Kong people although there may be some minor discrepancies between their knowledge and the compiled criteria.

[49] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 78.
[50] Ibid., 78-81.
[51] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 92.

3.1.1 Architectural Design

Feng Shui principles in architecture deal with the dimensions, architectural planning and elements of the building. As mentioned previously Dr. Evelyn Lip and Howard Choy focused on this topic. Dr. Evelyn Lip listed a set of standard rules of thumb for assessment of architectural design in her 13 Books on Feng Shui. Her design rules-of-thumb followed the Form School approach that are based on the information obtained from ancient Feng Shui texts, such as Yang Zhai Shi Shu (Ten Books on Dwellings of Living) and Shui Long Jing (Water Dragon Classic). The other scholar, Choy Howard wrote design checkpoints for architectural design with Michael Mak. He is the publisher of "Go with the flow" and introductory notes on Feng Shui written with Michael Mak.

3.1.2 Site Selection & Surrounding Elements

This area has to do with the surrounding elements such as water, hill and adjacent buildings or objects. Ke-Tsung Han, Xu Ping and The Tien Yong deal with this area. Han in his study of Feng Shui as a Chinese concept of the environmental studies suggested 24 major criteria for the selection of the best Feng Shui location. Ke-Tsung Han is a professor at the National Chin-yi University of Technology in Taiwan. In the aspects of landscaping and site selection for a house, Xu (1990) in her Feng Shui landscape model derived the procedures for dealing with land formations into four steps. Her dissertation submitted to the Harvard Graduate School of Design was on Feng Shui: A model for landscape analysis. Teh Tien Yong is a partner of Design International Architects (Singapore). He has more than 28 years of experience in the field of `planning, urban design, architecture, conservation, landscape and interiors. His career began in the Urban Redevelopment Authority of Singapore as a graduate and pioneer cohort member of

its scholarship programme. He wrote his paper after his study in the National University of Singapore in 1988.

This is no means the perfect accumulation of resources yet it's a comprehensive review that gives a general idea of what Feng Shui scholars and practitioners believe what constitutes Feng Shui principles. With the guidance of Michael Mak and Albert So's research and my personal research in to the study the set of principles acquired should be representative to a large degree what allows a building to be called a building with good Feng Shui. Feng Shui is a relatively subjective study where scholars hold views that do differ from each other to small degrees. Nevertheless, the principles held by these scholars were found to be of much correspondence and a summary of what they believe have been compiled.

3.2 Feng Shui Criteria

The Feng Shui Criteria has 6 categories which are under the overarching category Exterior and Interior. Each Feng Shui is placed under the category with a reference code. Each category is labelled with a letter and each Feng Shui principle carries the respective letter of the category it is under in its reference code. Hence, if a principle goes under principle A its reference code will take the form of A1. The table below shows what the categories are and what their respective letter codes are.

	Exterior				Interior	
Category	Site	Orientation	Street	Features	Layout	Components
Letter Code	A	B	C	D	E	F

Table 3-1 Feng Shui Criteria Categories

3.2.1 Feng Shui Criteria Table

Code	Site (Site Layout)	Sources
A1	It is recommended for the building to be built on high ground	Lip (1979)
A2	It is recommended that the building is slightly elevated	Choy (1999)
A3	It is recommended to have an open field or a garden to the south side of the building	Lip (1979)
A4	It is recommended that the building is protected by trees, another building or a high ground behind	Choy (1999)
	It is recommended that the building is protected on the sides	Choy (1999)
	it is recommended for the building to be surrounded by hills	Han (1995)
	It recommended for the site to be protected from winter winds	Xu (1990)
A5	It is recommended that there is an open and uncluttered area in front of the building	Choy (1999)
A6	It is not recommended for the building to be built on top of a hill	Han (1995)
A7	It is recommended to have hills in front of the building that is lower in height	Han (1995)
	It is recommended that the front hills are balanced in height with the building	Han (1995)
A8	it is not recommended for a river or stream to cut across the site	Yong (1998)
A9	It is not recommended for the building to be built over a well	Yong (1998)

Table 3-2 Category A (Site)

Code	Orientation	Sources
B1	It is recommended that the building faces the sunny side	Choy (1999)
	It is recommended that the building faces south	Han (1995)
	It is recommended that the house faces south east	Yong (1998)
B2	It is recommended that the back of the building faces north	Yong (1998)

Table 3-3 Category B (Orientation)

Code	Street (Street Structure)	Sources
C1	It is not recommended for a building to be built in front of a Y junction	Lip (1979)
	It is not recommended for the building to be at a T-junction or at the end of a cul de sac	Choy (1999)
	It is not recommended for the building to be at a T-junction	Yong (1998)
C2	It is not recommended for a building to be built in front of a narrow street	Lip (1979)
C3	It is recommended for the main road to be on the west side of the building	Lip (1979)

Table 3-4 Category C (Street)

Code	Features (Site Features)	Sources
D1	It is recommended to have trees planted on the North West side of the building	Lip (1979)
D2	It is not recommended to have a big tree in front of the building entrance	Lip (1979)
	It is not recommended that there is a tree in front of the house	Yong (1998)
D3	it is recommended that the building has a view of water features, artificial will do	Choy (1999)
	it is recommended to have flowing water in front of the site	Han (1995)
	It is recommended to have flowing water nearby	Xu (1990)
D4	It is not recommended for the building to have glare from sun or head lights	Choy (1999)
D5	It is not recommended for the building to be overshadowed or overlooked by taller buildings	Choy (1999)
	It is not recommended for the building to be overshadowed by a tall building	Yong (1998)
D6	it is not recommended for the building to be close to places with emotion and noise	Choy (1999)
D7	It is not recommended for the building to be close to pointed objects	Choy (1999)
D8	It is recommended that there is rich soil near the site	Han (1995)
D9	It is not recommended for the site to be unproductive and shot by water	Xu (1990)
D10	It is recommended that the site has water, trees and hilly features	Yong (1998)
D11	It is not recommended for the building to be surrounded by high boundary walls	Yong (1998)

Table 3-5 Category D (Features)

Code	Layout (Plan Layout)	Sources
E1	It is recommended that the most important area of a building is in the center	Lip (1979)
E2	It is recommended that the bedrooms are not located near the kitchen	Lip (1979)
E3	It is recommended that there is a transition space between the front door and the rest of the building	Choy (1999)
E4	It is recommended that the living area and kitchen look onto open space with plants and water	Choy (1999)
E5	It is recommended that the kitchens and the bathrooms are located on the edges of the building	Choy (1999)
	It is not recommended for the bathrooms and toilets to be near the front door	Choy (1999)
E6	It is not recommended for the kitchen to be near the front door	Choy (1999)
E7	It is recommended for the building to have a regular shape	Choy (1999)
E8	It is recommended that the depth of the room is greater than its width	Yong (1998)
E9	It is recommended that the living room is in the centre	Yong (1998)
E10	it is recommended that the master room is at the head of the living area	Yong (1998)
E11	It is recommended that the Kitchen is in the east or south east	Yong (1998)

Table 3-6 Category E (Layout)

Code	Components (Building Components)	Sources
F1	It is recommended for the building to have windows and doors facing the north and south sides	Lip (1979)
F2	It is recommended that the building has a back door that is not aligned with the front door	Lip (1979)
	It is not recommended for the main door to be aligned with another door	Yong (1998)
F3	It is recommended that the front entrance is visible, welcoming, appropriate in size and free of obstacles	Choy (1999)
F4	It is not recommended for the staircase to face the main door	Yong (1998)
F5	It is not recommended for a tree to go through the roof	Yong (1998)

Table 3-7 Category F (Components)

There have been many instances where multiple scholars stated the same principle so these were merged together. Like for example principle B1 which deals with orientation Choy, Han and Yong all said that facing south was recommended. Yong stated that the best direction to face was south east. So the principle compiled was made to recognize that facing south and south east was optimal. In this way the views of all the scholars are respected. This method of compilation was used for the rest of the principles and hence the tables formed as shown in Table 2-7. There is no hierarchy mentioned among the principles and each principle was considered equally valuable by the scholars. The principles are either well known or not well known however, this is no means of showing each principle's degree of significance.

3.2.2 Confirming Criteria

The following is the criteria that were compiled to understand whether a house has fulfilled the Feng Shui principles. The criteria are from the principles provided by the scholars. There is no middle ground but each house is given a clear distinct positive or negative position regarding each Feng Shui principle. The citations used in the criteria as shown in Table 2-8 will be cited in the beginning only.[52]

Code	Criteria for category Site
A1	The flat's building is within the boundaries of a registered mountain, peak or hill (Reference: Accumulation of data by Ben Wang through maps[53],)
A2	The flat is not on the same level as the pedestrian paths that directly run adjacently around the complex building
A3	There is an open space programmatically recognized as open space, green space, etc in the architectural plan south of building ±45 degrees.
A4	There are trees, building or a wall behind flat, that is the opposite side of where the entrance of the flat is positioned
A5	On the side where the entrance of the flat is positioned is an open space programmatically recognized as open space, green space, etc in the architectural plan
A6	The building complex where the flat is not within the last 10% of the contour lines of a a registered mountain, peak or hill (Reference: Accumulation of data by Ben Wang through maps[54])

[52] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 92-98
[53] "香港地方."
[54] Ibid.

A7	Any high ground in front is lower in height than the lower frame of the windows of the flat
	Any high ground in front is lower in height than the lower frame of the windows of the flat
A8	There is no river or stream that goes underground directly under the complex the flat is located in
A9	There is no well or water basin that goes underground directly under the complex the flat is located in

Table 3-8 Criteria for category A (Site)

Code	Criteria for category Orientation
B1	The side where the entrance of the flat is positioned faces a direction that is between south and south east
B2	The rear side where the entrance of the flat is positioned faces a direction that is between north and north west

Table 3-9 Criteria for category B (Orientation)

Code	Criteria for category Street
C1	There is no Y-junction directly on the side where the entrance of the flat is positioned. If there a road between the Y-junction and the flat this condition is fulfilled

	There is no T-junction or at the end of a cul de sac directly on either side of the flat. If there a road between the Y-junction and the flat this condition is fulfilled
C2	There is no one way street directly on the side where the entrance of the flat is positioned. If there a road between the Y-junction and the flat this condition is fulfilled
C3	On the west in relation to the flat facing where the entrance to the flat is located is positioned the widest road that goes directly by the apartment complex. If they are more roads of the same width this condition is not fulfilled.

Table 3-10 Criteria for category C (Street)

Code	Criteria for category Features
D1	On the north west side of the building they are more than one permanent tree
D2	There is no tree within the minimum of 1.5m[55] pedestrian path in front of the complex building
D3	More than 50% of the windows have a view of water that is living (sea, lake, etc) not still like in a swimming pool or artificial basins.
D4	There is no history of glare within the apartment complex - historically there have been few complaints, after a study of periodicals there is indication that this only happened in Mong Kok and Tsuen Kwan O[56].

[55] Hong Kong Planning Department, "Recommended Minimum Width Standards for Footpath/Walkway."
[56] South China Morning Post, "Residents Struggle with Glare as Light Pollution Spreads to Tseung Kwan O."

D5	There are no directly opposite flats within the separating distance of 7.5m (projected façade of building to site boundaries) that is over equal or taller height than the subject flat concerned.[57]
D6	It required that buildings do not face more than 70 dB(A) of sound for more than an hour[58]
D7	There should not be a building where its main structural element is of triangular form
D8	There are parks, hills, etc. directly next to the complex
D9	All buildings are not shot by water in Hong Kong as they cannot be inhabited if regulations are not compiled to
D10	There are parks, hills, etc. directly next to the complex
D11	More than 50% of the windows do not face a wall directly, that is there is no building or any site features between the wall and the window

Table 3-11 Criteria for category D (Features)

Code	**Criteria for category Layout**
E1	Living room is directly connected to 30% of the entire program of the flat
E2	None of the rooms are directly adjacent to the kitchen
E3	There is a transitional space programmatically in the architectural plan
E4	More than 50% of the kitchen and living room windows have a view of plants and/or living water
E5	All the Kitchen and Bathroom spaces as indicated in the architectural plan have at least one side not adjacent to another program

[57] Hong Kong Buildings Department, "Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers."
[58] Ng, "Lecture on Sound and Noise Hong Kong Planning Standards and Guidelines."

E6	The Kitchen is not the adjacent programmatic space to the front door
E7	The flat's layout fits perfectly in a square or a rectangle of variable ratio
E8	The depth of the 50% of all the bedrooms are greater than their widths
E9	Living room is directly connected to 30% of the entire program of the flat
E10	The Master room has at least three sides not adjacent to another program
E11	The Kitchen is in the south to south east end of the building, where the origin set at center of the flat

Table 3-12 Criteria for category E (Layout)

Code	**Criteria for category Components**
F1	50% of all windows within the flat excluding windows for ancillary programs face North or South $\pm$45 degrees
F2	Most flats in Hong Kong do not have a backdoor
F3	Doors that meet safety and accessibility regulations[59]
F4	The flat's entrance do not face more than 50% of the fire staircase door
F5	There is no biological organism that penetrates the roof membranes of the flat or the building complex

Table 3-13 Criteria for category (Components)

[59] Hong Kong Buildings Department, "Code of Practice for Fire Safety in Buildings.", 34.

3.3 Feng Shui's Environmental Implications

This topic was touched upon previously; however, further elaboration on the subject is necessary to understand the details how the environmental implications really come forth as Feng Shui principles are followed through. The concept of green building is to have started in 1973 with the Organization of the Petroleum Exporting Countries oil embargo which led to the Americans thinking of ways to reduce their reliance on fossil fuels as the source of energy.[60] The concept of green building was summed up by the Office of Federal Environmental Executive in 2003 as "the increasing efficiency with which buildings and their sites use water, energy and material; and reducing building impacts of human health and the environment, through better siting, design, construction, operation, maintenance and removal throughout the complete life cycle".[61] All these which can be achieved if building are designed to not isolate and "protect" it from its natural surrounding but rather be in harmony with it which is what Feng Shui aims to do.

When sites are chosen and the building planned according to Feng Shui the building becomes naturally sensitive to ecological concerns. Jia Bei Si, Associate Professor in the Faculty of Architecture, Hong Kong University of Hong Kong describes in detail how Feng Shui principles are in essence sensitive to the environmental issues that are faced when buildings are built. An ideal village is built on a slope that is not too steep but acceptable and the village should be backed by hills and flanked at both sides by hills. In the front flowing water should be visible and all these will facilitate good qi for the village people. All these show sensitivity towards ecological concerns. All the natural elements such as land, hills, water, orientation, soil and climate are considered when the village is planned and hence a boundary is formed. What's interesting though is that this boundary allows the people to use land and resources according to a set number of families. Others would not come live adjacent or in front not because they are sensitive to the burden they will have

[60] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 144.
[61] Ibid.

to the natural environment but because if they do inhabit they will have to build a village with bad Feng Shui. Although the motivation is superstitious it is interesting to see how this allows the ecology to be protected. [62]

3.3.1 Feng Shui Parallelism with Sustainable design

Xu in his thesis "A framework for site analysis with emphasis on Feng Shui" talks about the differences there are in the research approach, methodology, structure and objective among the western models that aim to achieve sustainability and Feng Shui. The bioclimatic model is concerned about the individual climate factors that affect an individual such as temperature, humidity, wind speed, radiation, etc. The environmentally conscious model on the other hand looks at the system as a whole and looks at the ecological system, that is, it makes sure the input and output of resources in each level that comprise of such as humans, animals and trees match each other and deficiencies are prevented from occuring at any stage.[63]

Feng Shui on the other hand is about qi and the environment and looks how much qi can be gathered for "good luck" and "well-being" for the individuals. Designing for "qi" does not provide any of those but allows one to design with the environment in mind and hence be in harmony with it. The bioclimatic model looks at the psychometric chart and tries to make sure the environment is designed so that the comfort levels are met and it is mainly concerned with the human comfort level. The environmentally conscious model identifies the values of each area that function in the system and tries to make sure there is better adaptation of the human systems to the natural environmental systems. Feng Shu on the other hand surveys the environment and tries to design in a way so that as much "qi" is collected. The

[62] Chen and Nakama, "A Summary of Research History on Chinese Feng-Shui and Application of Feng-Shui Principles to Environmental Issues.", 300.
[63] Xu, "A Framework for Site Analysis With Emphasis on Feng Shui and Contemporary Environmental Design Principles.", 44.

analysis structures differ as well among these three bodies of study. The first follows a frame structure where one aspect such as temperature is adjusted according to another aspect such as humidity. The environmentally conscious model follows a layer structure where one system such as the greenery is established one at a time. Finally in Feng Shui the big systems are looked initially and gradually the smaller systems are looked in to. This differs from the environmentally conscious model as there is a clear hierarchy in how Feng Shui structures its analysis.[64]

The Form school establishes a holistic approach that "allows integrated components and elements to be considered".[65] There are four concepts in Feng Shui and they comprise of Unity between heaven and human, the five element cycles, Yin and Yang harmony and the Form School model. Each of these concepts fosters sustainability. After a brief summary of them in a table each of these concepts will be delved in to more deeply and show how they achieve sustainability. After understanding the relationship between the concepts of Feng Shui and the areas of sustainability that is pursued today it will become clear as to why applying Feng Shui principles can bring sustainable and ecological benefits.

Feng Shui Fundamental Concepts	**Objective**
Unity between heaven and human	To achieve harmony between the universe, earth and human. By allowing good qi to flow harmony is achieved.
The five elements cycles	Achieve mutual relationships among Fire, Water, Metal, Wood and Earth.
Ying and Yang harmony	Achieve a balance between Ying and Yang within a space

[64] Xu, "A Framework for Site Analysis With Emphasis on Feng Shui and Contemporary Environmental Design Principles.", 44.
[65] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 148.

The Form School Model	Achieve optimal physical configuration of the surrounding site to accumulate qi

Table 3-14 Feng Shui Fundamental Concepts and their Objectives

The Unity between heaven and human is a fundamental concept where harmony between good Feng Shui design and the harmony allow a lot of qi to flow hence bring "well-being" to the inhabitants [66] As Sarah Rosebach says "Everything depended on everything", in Feng Shui the entire universe is understood as a living organization and everything is interdependent and is related to another. [67] Hence, in Feng Shui it is imperative that everything is in place or else it will be difficult for anything to function properly as they are all linked and needless to say have a great say on how the events of the individuals play out. Mak and So state that in Feng Shui "Harmony is valued in both the physical and the invisible forms known as "Qi" (natural energy)". [68] In Feng Shui the level of Qi that is accumulated within the area is a good measure of showing how strong the unity between the heaven and the humans of that rea will be. The stronger the unity the more "luck" there is.

[66] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 149.
[67] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 27.
[68] Ibid., 149.

Figure 3-1 View from Monkey Hiking Trail in Sai Kung, Hong Kong

Source: Author

The School of naturalists which was called the Ying and Yang school led by Zou Yan during 320 to 270 BC developed the theory of the Ying and Yang theory and the theory of the five elements.[69] The five elements comprise of wood, fire, earth, metal and water.[70] There are two cycles that allow these five elements to affect each other. The productive cycle is a cycle where it allows a harmonious cycle to occur and the order is as the following. It is productive for fire to go be with earth, earth to go be with metal, metal to go be with water, wood to go be with fire.[71]

The destructive cycle on other hand occurs when any of these elements go after another element other than the cycle presented in the productive cycle.[72] Metal cuts wood, water extinguishes fire, wood consumes earth, fire melts metal, earth dams

[69] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 30.
[70] Ibid., 30.
[71] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 149.
[72] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 149.

water.[73] It is about balance so it's not about making sure that everything complements each other but that some elements are suppressed by introducing other elements. For example, if a house has a lot of wood elements more metal elements should be introduced to balance the house out. There is no Feng Shui principle mentioned in the criteria established previously as this area is more about interior designing. So in the productive cycle if adding more metal elements is not enough than earth is introduced to this will strengthen the metal.[74]

The Ying and Yang harmony is simply about balance. Yin represents the passive things found in nature such as coldness and darkness. It also represents the realm of the dead. Yin represents femininity when it comes to human relationships not that femininity has any relationship with any of the mentioned dark representations. Yang on the other hand is polar opposite. Yang represents the active things found in nature such as light and heat. It represents masculinity. This is the principle of balance that is beheld in Feng Shui and a balance is required between Yin and Yang for a "balance in the user's life' to be achieved as Feuchtwang comments.[75]

The Form school which this thesis will focus on as mentioned earlier is about accumulating as much qi possible through optimal configuration. Although this thesis concentrates solely on the form school of Feng Shui all these principles are related although they have been birthed from different schools. The Form School and the Compass school concentrate on buildings and planning whereas unity between heaven and human, the five elements cycles and Ying and Yang harmony deal with other areas such as interior design and other aspects not delved in to in this thesis. The unity between human and earth has a lot to do with form school.

[73] "Feng Shui Elements"
[74] Ibid.
[75] Mak and So, op. cit., 149.

Mak and So then lays out how each of these relate to each key sustainability area that is pursued and researched today. In sustainability there is constructivism which is about making architectural spaces more enjoyable as human are given the opportunity to interact with the environment. There is circular design which is based on the cradle to cradle to concept where products are reused and recycled so materials are not wasted. This concept can be also applied in buildings. There is the call for the need of balance between natural and built environments where the introduction of natural elements in to a space increases one's behavior. Finally, there is energy efficiency which is achieved through careful architectural and site planning and also allow an efficient use of resources. How each of these sustainability principles relate to each of the mentioned Feng Shui principles has been summarized in the table below.[76]

Feng Shui Fundamental Concepts	**Sustainability Principle**
Unity between heaven and human	Constructivism
The Five Elements cycles	Circular Design
Ying and Yang harmony	Balance between the natural and the built environment
The Form School Model	Energy Efficiency

Table 3-15 Feng Shui Fundamental Concepts and Sustainability Principles [77]

The Form School approach is verified by many scholars such as He that it has a scientific basis of the built environment.[78] The other areas of Feng Shui such as interior design and balance definitely would have played a role in shaping the form school and its Feng Shui principles. Now with a foundational knowledge of the environmental implications Feng Shui has the Feng Shui criteria, that have been

[76] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 148,152.

[77] Ibid., 148-149.
[78] Ibid., 150.

listed in chapter 2.2.1 whether each principle has any environmental value will be looked in to more deeply. Feng Shui was influenced greatly by Confucianism as well which is about Chinese morality and social order.[79] This belief system had a great impact in the city forms and in Chinese architecture where this principle of hierarchy has manifested itself in physical form.[80]

3.4 Feng Shui Criteria Environmental Implications

In this stage each of the Feng Shui principles laid out previously will be observed with great care and an analysis done on whether they have positive, neutral or even negative environmental implications. This is important as just because a flat has fulfilled a large number of Feng Shui principles this does not automatically translate that the concerned flat is environmentally advantageous. The analysis was done in reference to various sources that comprise of green rating institutions, government advisory groups, scientific papers and theoretical papers. In this way the value of an environmental benefit can be measured as the more environmental benefit a certain design approach, orientation of a building is more legitimate study or coverage of it will have been done or made. For example if a principle is especially valuable in terms of the environment than it would be listed as a requirement that a building will have to fulfill to receive a green or sustainability rating from a certified institution. Nevertheless, the environmental aspects of each Feng Shui principle will be looked at after a thorough analysis of the resources available and give us clear insight as to how they actually play a role in enabling buildings to offer environmental advantages, disadvantages or none at all. A dissection of Feng Shui principles is essential in understanding their true value and with the scientific researches already done and available, it is of great excitement that the value of these principles can be unraveled and apprehended.

[79] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 28.
[80] Ibid.

Code	Feng Shui Principle	Source	Source Type
Code a	Environmental benefit A	Source	Source Type
Code b	Environmental benefit B	Source	Source Type
		Source	Source Type
…	…	…	…

Table 3-16 Environmental Implications Table Format

The format of the tables that will show the environmental implications of each Feng Shui principle will follow the format shown in Table 2-16. Under each Feng Shui principle a list of researched environmental implications are listed along with its source. Only legitimate sources such as research journals were included. If two or more sources agreed that a Feng Shui principle had this environmental implication they were merged together. Each Source is cited so that if desired a more in-depth study of the environmental implications can be pursued. As mentioned earlier the presumption is that the value of an environmental benefit can be measured according to the type of source as the more environmental benefits a certain principle brings the more legitimate study or coverage will have been done or made. There are three types of sources and they comprise of theoretical, scientific and certified institution's regulation where the latter source will indicate the highest level of value in terms of the potential environmental benefit it can potentially bring.

Theoretical implication		Scientific implication		Regulatory implication	
Theoretical	T	Scientific	S	Certified Institution's Regulation	CIR

Table 3-17 Type of Sources

Table 2-17 shows the types of implications each Feng Shui principle may have. Some principles may have no environmental implications and even negative ones and they have been taken account of as well. For those with no environmental principles N/A was used. Table 2-18 shows a summary of the types of sources.

Exterior								Interior			
A		B		C		D		E		F	
A1	S	**B1**	CIR	**C1**	T	**D1**	S	**E1**	T	**F1**	T
A2	S	**B2**	CIR	**C2**	T	**D2**	CIR	**E2**	T	**F2**	T
A3	CIR			**C3**	T	**D3**	S	**E3**	T	**F3**	CIR
A4	T					**D4**	S	**E4**	T	**F4**	N
A5	T					**D5**	CIR	**E5**	T	**F5**	S
A6	S					**D6**	CIR	**E6**	S		
A7	CIR					**D7**	S	**E7**	S		
A8	CIR					**D8**	S	**E8**	S		
A9	T					**D9**	S	**E9**	T		
						D10	CIR	**E10**	T		
						D11	T	**E11**	T		

Table 3-18 Feng Shui Principles and Source Types

A1	**It is recommended for the building to be built on high ground**	**Lip (1979)**
A1a	Homes that are higher in altitude enjoy better sea view and less building view	Chau (2007) [81]
A2	**It is recommended that the building is slightly elevated**	**Choy (1999)**
A2a	The elevated floor prevents sudden flooding, protects occupants from dangerous animals and allows more wind to enter the building	Tantasavasdia (2001) [82]
A3	**It is recommended to have an open field or a garden to the south side of the building**	**Lip (1979)**
A3a	Good amount of sunlight can enter the building	Chang (2014)[83]
		USGBC (2002)[84]
A4	**It is recommended that the building is protected by trees, another building or a high ground behind**	**Choy (1999)**
	It is recommended that the building is protected on the sides	**Choy (1999)**
	it is recommended for the building to be surrounded by hills	**Han (1995)**
	It recommended for the site to be protected from winter winds	**Xu (1990)**
A4a	The building from the rear and sides are protected, winter winds are protected	Chang (2014)[85]
A5	**It is recommended that there is an open and uncluttered area in front of the building**	**Choy (1999)**
A5a	Promotes equal wind distribution and reduces the risk of blast	Chang (2014)[86]

[81] Chau et al., "Determining Optimal Building Height.", 603.
[82] National Association of Home Builders Research Center, "Designing for Flood Levels above the BFE.", 1.
[83] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[84] US Green Building Council, "Green Building Rating System For New Construction & Major Renovations."
[85] Chang et al., op. cit., 3.
[86] Ibid.

A6	**It is not recommended for the building to be built on top of a hill**	**Han (1995)**
A6a	Steep slopes are high risk areas for landslides to occur	Burns (2017)[87]
A7	**It is recommended to have hills in front of the building that is lower in height**	**Han (1995)**
	It is recommended that the front hills are balanced in height with the building	**Han (1995)**
A7a	Increases the amount of sunlight and ventilation as the building is placed on a higher ground	Chang (2014)[88]
		USGBC (2002)[89]
A8	**it is not recommended for a river or stream to cut across the site**	**Yong (1998)**
A8a	Avoid building in a flood plain unless the building is elevated and reinforced	FEMA (2017)[90]
A9	**It is not recommended for the building to be built over a well**	**Yong (1998)**
A9a	It is unfavorable for the kitchen to be close to a well as drinking water could be contaminated by the well	Chang (2014) [91]
B1	**It is recommended that the building faces the sunny side**	**Choy (1999)**
	It is recommended that the building faces south	**Han (1995)**
	It is recommended that the house faces south east	**Yong (1998)**
B1a	Good amount of sunlight can enter the building	Chang (2014)[92]
		USGBC (2002)[93]

[87] Burns, "Homeowner's Guide to Landslides.", 8.
[88] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[89] US Green Building Council, "Green Building Rating System For New Construction & Major Renovations."
[90] Federal Emergency Management Agency, *Are You Ready*, 52.
[91] Chang et al., op. cit., 3.
[92] Ibid.

B1b	Facing south not only gives access to light but also provide shelter from the wind. Chinese climate belongs to the monsoon type and includes cool and warm winds. Feng Shui principles of orientation are to choose sites facing toward the east and south which can accept the pleasant and warm wind called Yang Feng. However, a site facing to the north and west suffers a cool or chilly wind called Yin Feng	Bo (2013)[94]
		USGBC (2002) [95]
B2	**It is recommended that the back of the building faces north**	**Yong (1998)**
B2a	Facing south not only gives access to light but also provide shelter from the wind.	Bo (2013) [96]
		USGBC (2002) [97]
C1	**It is not recommended for a building to be built in front of a Y junction**	**Lip (1979)**
	It is not recommended for the building to be at a T-junction or at the end of a cul de sac	**Choy (1999)**
	It is not recommended for the building to be at a T-junction	**Yong (1998)**
C1a	Wind blast is caused due to the lack of wind paths, and for the T-junction strong winds are caused by vehicles	Chang (2014) [98]
C2	**It is not recommended for a building to be built in front of a narrow street**	**Lip (1979)**
C2a	Strong winds may hit the building from moving vehicles	Chang (2014) [99]
C3	**It is recommended for the main road to be on the west side of the building**	**Lip (1979)**

[93] US Green Building Council., op. cit.
[94] Bo, "Traditional Feng Shui Architecture as an Inspiration for the Development of Green Buildings.", 73.
[95] US Green Building Council, "Green Building Rating System For New Construction & Major Renovations."
[96] Bo., op. cit., 73.
[97] US Green Building Council., op. cit
[98] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[99] Ibid.

C3a	The building is exposed to more sunlight	Chang (2014) [100]
D1	**It is recommended to have trees planted on the North West side of the building**	**Lip (1979)**
D1a	The building from the rear and sides are protected, winter winds are protected	Chang (2014) [101]
D2	**It is not recommended to have a big tree in front of the building entrance**	**Lip (1979)**
	It is not recommended that there is a tree in front of the house	**Yong (1998)**
D2a	Actually recommended for environmental reasons	USGBC (2002) [102]
D3	**it is recommended that the building has a view of water features, artificial will do**	**Choy (1999)**
	it is recommended to have flowing water in front of the site	**Han (1995)**
	It is recommended to have flowing water nearby	**Xu (1990)**
D3a	Open water spaces mitigate urban heat, the conversion of small rivers in to channels and construction of ponds are recommended	Yamamoto (2006)[103]
D4	**It is not recommended for the building to have glare from sun or head lights**	**Choy (1999)**
D4a	Glare can cause loss of productivity and headaches	Leban (2017) [104]
D5	**It is not recommended for the building to be overshadowed or overlooked by taller buildings**	**Choy (1999)**
	It is not recommended for the building to be overshadowed by a tall building	**Yong (1998)**

[100] Ibid.
[101] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[102] US Green Building Council, "Green Building Rating System For New Construction & Major Renovations."
[103] Yamamoto, "Measures to Mitigate Urban Heat Islands.", 71.
[104] Leban, "Glare Matters.", 11.

D5a	Tall buildings influence the micro environment as it casts shadows and blocks views as well as sunlight	Ali (2012)[105] USGBC (2002)[106]
D6	**it is not recommended for the building to be close to places with emotion and noise**	**Choy (1999)**
D6a	Noise causes a variety of physiological changes in mammals	Broucek (2014)[107]
D7	**It is not recommended for the building to be close to pointed objects**	**Choy (1999)**
D7a	At incidence angles of 60 degrees or more the reflectance of PV glass can be 20% more than normal	Ho (2013)[108]
D8	**It is recommended that there is rich soil near the site**	**Han (1995)**
D8a	Healthy soil offers many benefits ranging from reducing soil erosion, reducing water runoff and retaining carbon from the atmosphere	USEPA (2015)[109]
D9	**It is not recommended for the site to be unproductive and shot by water**	**Xu (1990)**
D9a	Healthy soil offers many benefits ranging from reducing soil erosion, reducing water runoff and retaining carbon from the atmosphere	USEPA (2015)[110]
D10	**It is recommended that the site has water, trees and hilly features**	**Yong (1998)**
D10a	Grassy areas and trees mitigate the urban heat effect	Bristow (2010)[111]

[105] Mir and Al-Kodmany, "Tall Buildings and Urban Habitat of the 21st Century: A Global Perspective.", 385.
[106] US Green Building Council., op. cit
[107] Brouček, "EFFECT OF NOISE ON PERFORMANCE, STRESS, AND BEHAVIOUR OF ANIMALS.", 113.
[108] Ho, "Relieving a Glaring Problem.", 30.
[109] USEPA, "Healthy Soils and Air Quality."
[110] Ibid.
[111] Bristow, Blackie, and Brown, "PARKS AND THE URBAN HEAT ISLAND: A LONGITUDINAL STUDY IN WESTFIELD, MASSACHUSETTS.", 229.

D11	**It is not recommended for the building to be surrounded by high boundary walls**	**Yong (1998)**
D11a	The building is exposed to more sunlight	Chang (2014)[112]
		USGBC (2002) [113]
E1	**It is recommended that the most important area of a building is in the center**	**Lip (1979)**
E1a	It is unfavorable for the kitchen to be located in the center of the home due to hygiene reasons, it is also unfavorable for the toilet to be located in the center of the home also because hygiene reasons	Chang (2014) [114]
E2	**It is recommended that the bedrooms are not located near the kitchen**	**Lip (1979)**
E2a	This is unfavorable due to hygiene reasons	Chang (2014) [115]
E3	**It is recommended that there is a transition space between the front door and the rest of the building**	**Choy (1999)**
E3a	Having a well-designed transitional space can potentially save energy	Pitts (2006)[116]
E4	**It is recommended that the living area and kitchen look onto open space with plants and water**	**Choy (1999)**
E4a	Grassy areas and trees mitigate the urban heat effect	Yamamoto (2006)[117]
E5	**It is recommended that the kitchens and the bathrooms are located on the edges of the building**	**Choy (1999)**
	It is not recommended for the bathrooms and toilets to be	**Choy (1999)**

[112] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[113] US Green Building Council, "Green Building Rating System For New Construction & Major Renovations."
[114] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[115] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[116] Pitts and Saleh, "Transition Spaces and Thermal Comfort - Opportunities for Optimising Energy Use.", 6.
[117] Yamamoto, "Measures to Mitigate Urban Heat Islands.", 71.

	near the front door	
E5a	Ancillary buildings can block winds and protect the more primary buildings	Chang (2014) [118]
E6	**It is not recommended for the kitchen to be near the front door**	**Choy (1999)**
E6a	It is recommended for the kitchen to be near the other 'wet areas' to minimize the length of pipes	Queensland Government (2017)[119]
E7	**It is recommended for the building to have a regular shape**	**Choy (1999)**
E7a	Glare can cause loss of productivity and headaches	Leban (2017) [120]
E8	**It is recommended that the depth of the room is greater than its width**	**Yong (1998)**
E8a	Louden's room ratio of 1:1.4:1.9 allows sound to be optimally reverberated	Cox (2017)[121]
E9	**It is recommended that the living room is in the centre**	**Yong (1998)**
E9a	The center of the home will have vitality	Chang (2014) [122]
E10	**it is recommended that the master room is at the head of the living area**	**Yong (1998)**
E10a	The center of the home will have vitality	Chang (2014) [123]
E11	**It is recommended that the Kitchen is in the east or south east**	**Yong (1998)**
E11a	It is unfavorable for the kitchen to be located in the center of the home due to hygiene reasons, it is also unfavorable for the	Chang (2014) [124]

[118] Chang et al., op. cit., 3.
[119] Queensland Government, "Smart and Sustainable Homes.", 1.
[120] Leban, "Glare Matters.", 11.
[121] Cox and D'Antonio, "Determining Optimum Room Dimensions for Critical Listening Environments: A New Methodology.", 5.
[122] Chang et al., "Quantification of Feng-Shui Principles in the Design of Korean Houses.", 3.
[123] Ibid.

	toilet to be located in the center	
F1	**It is recommended for the building to have windows and doors facing the north and south sides**	**Lip (1979)**
F1a	Cross ventilation is better achieved	Chang (2014)[125]
F2	**It is recommended that the building has a back door that is not aligned with the front door**	**Lip (1979)**
	It is not recommended for the main door to be aligned with another door	**Yong (1998)**
F2a	Cross ventilation is better achieved	Chang (2014)[126]
F3	**It is recommended that the front entrance is visible, welcoming, appropriate in size and free of obstacles**	**Choy (1999)**
F3a	It is not recommended to plant in front of building entrances in order to allow easier access by the fire department	NYC Parks (2014)[127]
F4	**It is not recommended for the staircase to face the main door**	**Yong (1998)**
F4a	No sources found	-
F5	**It is not recommended for a tree to go through the roof**	**Yong (1998)**
F5a	In 2015 workers were most frequently struck by plants, trees and vegetation	US DPL[128] (2016)

Table 3-19 Feng Shui Principles' Environmental Implications

[124] Ibid.
[125] Ibid.
[126] Ibid.
[127] NYC Parks, "Tree Planting Standards.", 2.
[128] US Department of Labor, "National Census of Fatal Occupational Injuries in 2015.", 3.

3.4.1 Confirming Feng Shui's Environmental Implications

With the potential environmental implications laid out in the previous sub chapter it is essential that whether the flat can really reap the expected environmental benefits or detriments is verified. A principle is merely a principle but whether it can actually help depends on the context and there are various variables that come in to play. For example a house may face south but is towered by another building so it only enjoys only 2 hours of sunlight every day. The flat may have good Feng Shui when it comes to orientation and theoretically enjoy good sunlight. However, in reality this is not the case. This is the reason why it is imperative that each flat need to be checked according to a set of verification guidelines that will enable us to understand whether a Feng Shui principle applied in a certain flat allows the flat in question to benefit from the environmental implications that come with that particular Feng Shui principle. This is an interesting area to study in depth.

Code	**Environmental Implications Verifying Specification**	**Source**
Code	Verification Specification A	Source
Code	Verification Specification B	Source
	Verification Specification C	Source
…	…	…

Table 3-20 Environmental Implications Verifying Specification Table Format

A1	A height of 47 stories (approx. 140m) is when Marginal Revenue of a flat starts to rise because of view benefits. From sea level	Chau (2007)[129]

[129] Chau et al., "Determining Optimal Building Height.", 60.

A2	Insurance reduction start from a minimum of 1 foot of elevation from ground level	FEMA (2013)[130]
A3	In Hong Kong the winter sun is 45 degrees with the length of shadow having a ratio of 1:1 (of building height). Make sure that the impact shadow does not touch the building	Ng (2015)[131]
A4	Find direction of winter wind quote, open area 500sqm street frontage at least 13.5 in width	Development Bureau (2017)[132]
A5	Find direction of winter wind quote, open area 500sqm street frontage at least 13.5 in width	Development Bureau (2017)[133]
A6	The building complex where the flat is not within the last 10% of the contour lines of a a registered mountain, peak or hill (Reference: Accumulation of data by Ben Wang through maps[134])	Ben Wang (2017)[135]
A7	If there is open area 500sqm street frontage at least 13.5 in width	Development Bureau (2017)[136]
A8	There is no visible river or stream cutting the site	-
A9	There is no visible well within the site	-
B1	The side where the entrance of the flat is positioned faces a direction that is between south and south east	USGBC (2002) [137]
B2		USGBC

[130] Federal Emergency Management Agency, *Are You Ready?*, 7.
[131] Ng, "Solar Workshop.", 42.
[132] Development Bureau, "Public Open Space in Private Developments Design and Management Guidelines.", 18.
[133] Ibid.
[134] "香港地方."
[135] Ibid.
[136] Development Bureau., op. cit., 18.
[137] US Green Building Council, "Green Building Rating System For New Construction & Major Renovations."

	The rear side where the entrance of the flat is positioned faces a direction that is between north and north west	(2002) [138]
C1	There is no Y-junction directly on the side where the entrance of the flat is positioned. If there a road between the Y-junction and the flat this condition is fulfilled	-
	There is no T-junction or at the end of a cul de sac directly on either side of the flat. If there a road between the Y-junction and the flat this condition is fulfilled	-
C2	There is no one way street directly on the side where the entrance of the flat is positioned. If there a road between the Y-junction and the flat this condition is fulfilled	-
D1	The planted trees are of the wind break type as recommended, large scale or small scale trees	Penn State College of Agricultural Sciences (2017)[139]
D2	There is no tree within the minimum of 1.5m[140] pedestrian path in front of the complex building	Hong Kong Planning Department (2017)[141]

[138] Ibid.
[139] "Using Trees and Shrubs for Privacy and Wind Screening (Home Lawn and Garden)."
[140] "Table 9: Recommended Minimum Width Standards for Footpath/Walkway."
[141] Hong Kong Planning Department, "Recommended Minimum Width Standards for Footpath/Walkway."

D3	"Both large and small parks have been found to provide cooling, with the effects propagating to a distance approximately half the park width away" Flat is within half the width of the park	Hathway (2012)[142]
D4	There is no history of glare within the apartment complex - historically there have been few complaints, after a study of periodicals there is indication that this only happened in Mong Kok and Tsuen Kwan O, Hence most flats can be assumed that they do not face this problem	South China Morning Post (2009)[143]
D5	In Hong Kong the winter sun is 45 degrees with the length of shadow having a ratio of 1:1 (of building height). Make sure that the impact shadow does not touch the building concerned.	Ng (2015)[144]
D6	It required that buildings do not face more than 70 dB(A) of sound for more than an hour	Ng (2015)[145]
D7	At incidence angles of 60 degrees or more the reflectance of PV glass can be 20% more than normal. Light does not enter the building at angles more than 60 degrees.	Ho (2013)[146]
D8	There are parks, hills, etc. directly next to the complex	-
D9	There are parks, hills, etc. directly next to the complex	-
D10	18 m 90% of damage, useful distance	Overbeke (1989)[147]
D11	In Hong Kong the winter sun is 45 degrees with the length of shadow having a ratio of 1:1 (of building height). Make sure that the impact shadow does not touch the building concerned.	Ng (2015)[148]

[142] Hathway, "The Interaction of Rivers and Urban Form in Mitigating the Urban Heat Island Effect: A UK Case Study.", 1.
[143] South China Morning Post, "Residents Struggle with Glare as Light Pollution Spreads to Tseung Kwan O."
[144] Ng, "Solar Workshop.", 42.
[145] Ng, "Lecture on Sound and Noise Hong Kong Planning Standards and Guidelines.", 1.
[146] Ho, "Relieving a Glaring Problem.", 30.
[147] Overbeke, "Does It Really Matter If There Is a Tree near a Building?", 2.
[148] Ng., op. cit., 42.

E1	Living room is directly connected to 30% of the entire program of the flat	-
E2	None of the rooms are directly adjacent to the kitchen	-
E3	There is a transitional space programmatically in the architectural plan	-
E4	Find prevalent wind, and see if there is open area 500sqm street frontage at least 13.5 in width	Development Bureau (2017)[149]
E5	There is coverage of wind on the north east as the prevalent winter wind of Hong Kong blows from the north east direction. Ancillary buildings location.	Hong Kong Observatory (2017)
E6	The Kitchen is not the adjacent programmatic space to the front door	-
E7	The flat's layout fits perfectly in a square or a rectangle of variable ratio	-
E8	Louden's room ratio of 1:1.4:1.9 allows sound to be optimally reveberated	Cox (2017)[150]
E9	Living room is directly connected to 30% of the entire program of the flat	-
E10	The Master room has at least three sides not adjacent to another program	-
E11	East or South East is clear of any immediate towering buildings or objects and the distance between the immediate kitchen element and the dining table or other furniture is 183cm	House Plans Helper (2017)[151]
F1	The following conditions are required for optimal cross ventilation. The floor depth should not be more than 15m. The total area of openings should be 20 to 30 percent of the floor area.	Thomas (2014)[152]

[149] Development Bureau, "Public Open Space in Private Developments Design and Management Guidelines.", 18.
[150] Cox and D'Antonio, "Determining Optimum Room Dimensions for Critical Listening Environments: A New Methodology.",5.
[151] House Plans Helper, "Kitchen Dimensions."
[152] Thomas, "Effective Natural Ventilation in Modern Apartment Buildings.", 18.

F2	The following conditions are required for optimal cross ventilation. The floor depth should not be more than 15m. The total area of openings should be 20 to 30 percent of the floor area.	Thomas (2014)[153]
F3	Doors that meet safety and accessibility regulations	Hong Kong Buildings Department (2011)[154]
F4	N/A	N/A
F5	There is no biological organism that penetrates the roof membranes of the flat or the building complex	Hong Kong Buildings Department (2011)[155]

Table 3-21 Environmental Implications Confirming Criteria

[153] Ibid.
[154] Hong Kong Buildings Department, "Code of Practice for Fire Safety in Buildings."
[155] Ibid.

4. Results

4.1 Feng Shui principles' link with environmental issues through human experience and observation

In the introduction and previous sub chapter how Feng Shui was linked strongly with the environment was delved in to and in this chapter the linkage will be explored through the human experience and observation history links. Two papers were looked at and the first one is "A summary of research history on Chinese Feng Shui and application of Feng Shui principles to environmental issues" written by Chen and Nakama both from the University of Okinawa.[156] They deal with Feng Shui's situation in China although they are based in Japan. Feng Shui is related to ancestor worship and something that was produced to bring "luck" to an individual so that he or she could live a prosperous life. It is to have gone through several processes of change in align to the social and economic changes that have happened in human history. [157] Feng Shui was considered very important by the Chinese when China was less developed but the study has lost a lot of its influence as the nation developed. However, it has existed for more two thousand years and was integrated with almost all aspects of the Chinese life. Feng Shui was derived from human observations and experiences and is a reflection of the Chinese lifestyle. The first resource talks about how certain Feng Shui principles are applied in a deeper way which has not been done by the scholars used in this thesis and from that this thesis tries to derive meaning and the human link that have led to the principles formation.

[156] Chen and Nakama, "A Summary of Research History on Chinese Feng-Shui and Application of Feng-Shui Principles to Environmental Issues."
[157] Ibid., 298.

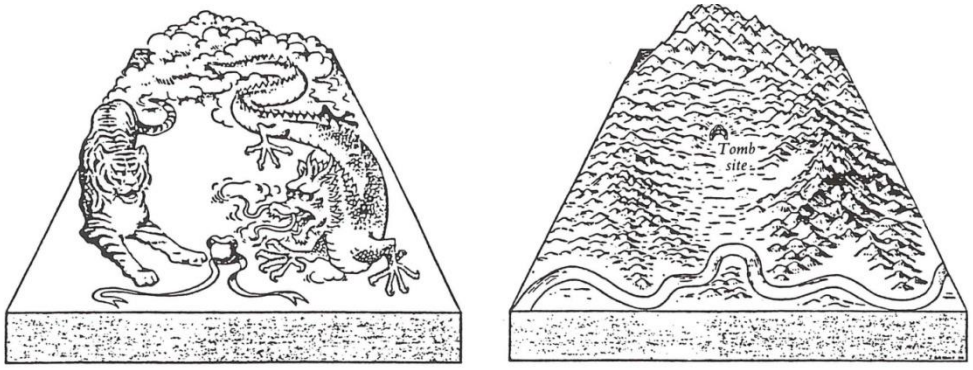


Figure 4-1 Ideal Feng Shui landscape

Source: Alan Mak (2004)[158]

Yoon recognized in 1980 along with other ecologists that "man should live in harmony with nature, and that human activities should be designed with nature". [159] The paper lays out that "An ideal village should be located in a recessed position. This would enable the village to be both secluded and sheltered while commanding a view of the fields and distant landscape in front. It should preferably be backed by hills and flanked on both sides by hills."[160] And this configuration is to allow 'qi' to enter in to the village. However, it needs to be recognized areas which are backed and flanked by hills with ideally a river are not everywhere and hence villages will have to be within considerable distance from one another if all the villages concerned are to have good Feng Shui configurations. Moreover, the villages in the past were composed of clans so not everyone would have been welcomed in.

However, how did this configuration that is considered good Feng Shui come about? A reason may be because of almost trial and error. Protection from the winter winds and other harsh winds, exposure to a good amount of sunlight, a nearby water

[158] Yong, "FENGSHUI: Its Application in Contemporary Architecture.", 28.

[159] Chen and Nakama, "A Summary of Research History on Chinese Feng-Shui and Application of Feng-Shui Principles to Environmental Issues.", 299.
[160] Ibid., 300.

source all constitutes good conditions for survival. What is neat about this is as mentioned is that this limits overpopulation of one area and allows resources not be to overly cultivated by a village. Good conditions led to prosperous lives and hence became good Feng Shui. Another important aspect in Feng Shui is “Some major means to repair the defected Feng-shui environment includes ditching to lead water around the village, planting vegetation”. [161] This shows that actually if the site does not meet the requirements of what is a good Feng Shui adhering configuration modifications can instead be made.

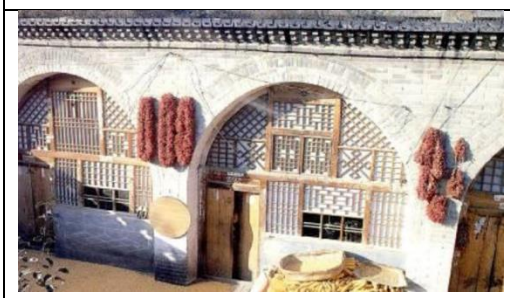
This is interesting as this shows that this has been done before in ancient history. It can be derived from this fact that in reality these principles were developed for survival purposes in the beginning. Many presume that in Feng Shui a site is a site and intervention is of no use but Feng Shui even today is really about modifying the environment. This concept of modification and the allowance of it is proof that actually Feng Shui principles were based on survival and on what works and hence is an observation of human experience and a reflection of what works in nature.

The study states that “water was given a primary status, since water was deemed to bring fortune and prosperity for the villagers. Among the general rule of site selection" hinder the wind and obtain the water". Hindering the wind and obtaining the water are both related to survival rather than random activities that fuels superstition or something that bring psychological relief by making a place “lucky”. Water is to have been “deemed to bring fortune and prosperity to the villagers”. This is of no surprise as water is an essential necessity for farming and daily life. People who lived close to water sources would have been more successful than those who did not, hence water would have been seen to be lucky to have nearby.

The second paper that was looked at was “Traditional Feng Shui Architecture as an inspiration for the development of green buildings”. This resource delves in to 3 major principle scopes of Feng Shui which this thesis paper looks at and talks in

[161] Chen and Nakama, “A Summary of Research History on Chinese Feng-Shui and Application of Feng-Shui Principles to Environmental Issues.”, 300.

detail what the environmental implications and the principles' significance are. The paper aims to "help absorb and inherit the essence of Feng Shui and provide the cultural foundation and methods for the development of green building". From this study how exactly the Feng Shui principles help relieve the "ecological stress", a term mentioned before is made known. The paper's main statement is "Ancient Feng Shui architecture strongly advocates keeping harmony between mankind and nature and closely aligns construction and the ecological environment, consistent with the concept of green building."

<table>
<tr><th colspan="2">Principle of using the local context</th></tr>
<tr><td colspan="2">"Utilization of local conditions also means human should adapt to nature according to the objective environment" China is a vast land with various land terrain and climate, below are shown examples of different ways the different houses were built in harmony with the local conditions by using its materials and adapting to it.</td></tr>
<tr><td> 
Figure 4-2 Northwest China Cave Dwellings</td><td>"The northwest has little rain with drought conditions, so people dig caves as dwellings"</td></tr>
<tr><td>  </td><td>"The southwest is moist and has many insects and animals, so people construct residential bamboo buildings suspended above the ground"</td></tr>
</table>

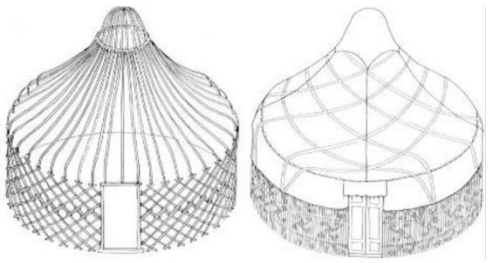
<table>
<tr><td>Figure 4-3 Southwest China Suspended Houses</td><td></td></tr>
<tr><td> 
Figure 4-4 Mongolian Portable Housing</td><td>“The prairie herders in Mongolia have portable housing with grass mats allowing them to migrate easily”</td></tr>
<tr><td> 
Figure 4-5 Guizhou's Masonary Houses</td><td>“People in the mountains of Guizhou and Dali build stone masonry houses, but people in the central plains build houses with soil”</td></tr>
<tr><td colspan="2">The use of local materials show that this principle that was developed in to Feng Shui was actually a principle used for a means of survival. In the past one had to build their homes in harmony with the environment to be effective in the local climate, and one way of doing this was by using local materials. Those who failed to do this did not live well and were seen as unlucky while those who did were seen as so and hence, the principle was seen as lucky and incorporated in to Feng Shui.</td></tr>
</table>

Table 4-6 Principle of using the local context in different parts of China[162]

[162] Bo, “Traditional Feng Shui Architecture as an Inspiration for the Development of Green Buildings.”

<table>
<tr><th colspan="2">Water and Hill Site Features</th></tr>
<tr><td> 
Figure 4-7 Mufu Mountains, Nanjing, China</td><td>“Three faces of the residence are circled by mountains, one side is open, and the houses are hidden by tree leaves, just as the Zhang Guying village in Hunan which is located in this terrain. The Mufu Mountains extend five hundred miles here. Three big peaks raised in the east, north and west sides, such as a lotus with three large petals”</td></tr>
<tr><td> 
Figure 4-8 Wuhan University</td><td>“Wuhan University is situated in the Luojia Mountains and built against the mountainside. The student dormitories are close to the hillside, ringed with curved walls with a gate-shaped entrance. The mountain platform takes the city gate entrance as its axis.”</td></tr>
<tr><td colspan="2">Water as mentioned earlier is vital to human survival and its close proximity is essential if a village is to have a good harvest. Hilly site features provide protection for a village which is also needed for survival.</td></tr>
</table>

Table 4-4 Principle of Water and Hill features[163]

[163] Bo, “Traditional Feng Shui Architecture as an Inspiration for the Development of Green Buildings.”

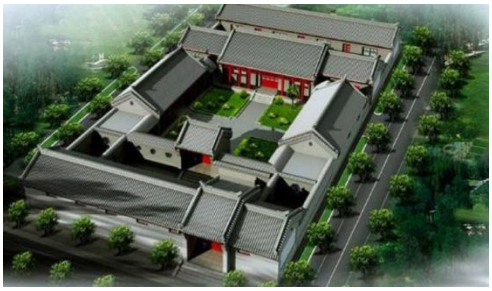
<table>
<tr><td colspan="2">Principle of facing South</td></tr>
<tr><td> 
Figure 4-9 Typical Traditional Quadrangle Courtyard of North China</td><td>“The traditional quadrangle courtyard in north China is the typical building which has experienced three thousands of years of use”</td></tr>
<tr><td colspan="2">Facing south is an architectural aspect of a house that brings tremendous benefits as it allows the building if designed properly block the summer sun and allow the winter sun in. Having a south orientation also protects a house from the sunrise and sunset glare and also protects it from overheating.</td></tr>
</table>

Table 4-5 Principke of facing South[164]

From the detailed study of the two papers and an analysis of how these principles may have come forth, which was made possible by the detailed Feng Shui principle description provided, it can be seen that Feng Shui principles were a reflection of principles that allowed one to prosper in a certain environment. The human experience of what works and what doesn’t, because back then when technology was primitive, in order for the human beings to prosper they had to respect the environment. This was the basis of what made the Feng Shui principles that exist today. The principles are merely known to bring luck but this is not really true because the principles are almost already set for success.

[164] Bo, “Traditional Feng Shui Architecture as an Inspiration for the Development of Green Buildings.”

4.2 The Grey Area of Feng Shui

An article showing Donald Trump's use of Feng Shui in his real estate holdings with the help of Feng Shui master Pun-Yin was published in the Guardian in 2016. President Donald Trump was the Republican presidential nominee during time of the article's publication. Feng Shui master Pun-Yin states that "for decades, incorporating those principles into his real estate holdings was one of Trump's foremost priorities."[165] However, she states that Trump's use of Feng Shui was hardly spiritual and that Trump hired her and her father in order to tap in to the market for international investors where the Chinese were without doubt among the big players. The article states that good Feng Shui could have been presumed to be the deal breaker for Donald Trump. As mentioned by the article Bill Seto, a verteran New York broker, stated that Feng Shui now was a tool of trade although in the past it was only known as some obscure Eastern philosophy.

There is a business element to Feng Shui today where the primary role is sometimes to reach a market that is not accessible without the ancient body of study. Although Feng Shui as mentioned can bring environmental benefits, due to as hypnotized its origin being the principles of human survival, it has a grey area which keeps many away from the study. The grey area is the moves that have been made by Feng Shui masters that have been deemed to be excessively superstitious by many. As mentioned in the introduction there was the example of the HSBC building. The HSBC building is to have two canons facing the Bank of China to repel the bad energy that is supposedly to be emanating from it due to its sharp edges.[166] Another example that is considered excessive is the swimming pool in the Hopewell Centre. When it was built the Feng Shui masters are to have recommended a swimming

[165] Oldershausen, "Meet Donald Trump's Feng Shui Master."
[166] "Feng Shui Myths of Hong Kong Landmarks."

pool to be placed on the roof because they believed the building resembled a candle which had connotations of death. [167]

As to why Feng Shui masters give advice that is considered excessive by many is made especially hard to understand especially as "Feng Shui secrets were guarded jealously by the masters and were often only passed on to close disciples when the master was near death". [168] Hence, it is highly likely that it will be never fully understood or discovered why Feng Shui masters give their advices since a majority of what their recommendations are based on are sealed off. What's more Ole Bruun in his book Feng Shui in China makes an interesting statement. "Among these parties, fengshui takes on different roles and meanings, not as a unified system of belief, but as an aggregation of ideas, practices and pieces of knowledge that derive from various sources: old classics, the teachings of local masters in pre-liberation times and new constructions by the present generation of geomancers."[169]

Bruun makes another revealing statement "The popular material even started a wave of applied fengshui, which since the early 1990s till the present has reached sensational proportions; the masters now practicing in all major cities in the West have backgrounds as dubious as those of their contemporaries in China".[170] What has been gathered in this is that although there is a general Feng Shui knowledge that is made available through scholars but there is also an area of Feng Shui that is hidden, inconsistent and have been shaped by multiple sources. It is a grey area which no one really confronts.

The thesis makes the hypothesis that the reason as to why Feng Shui masters sometimes give excessive and even eccentric advices is because their knowledge of Feng Shui is first of all have been altered by many sources and influenced by others, and hence no longer reflect the human survival principles and automatically thus hold no environmental value. The second reason may be due to the business aspect

[167] Ibid.,
[168] Ludrup, *Feng Shui: Seeing Is Believing*, 5.
[169] Bruun, *Feng Shui in China*, 159.
[170] Bruun, *Feng Shui in China*, 237.

of Feng Shui. It is natural to be competitive to be brash, different and radical especially when it comes to this body of study where big money is involved. A Feng Shui consultation service for a home can cost 480 US dollars.[171] It is the thesis' presumption that the secrecy of the Feng Shui masters' hidden knowledge of Feng Shui and the drive to be competitive led to the dissemination of Feng Shui advices that have been considered to be excessive and unnecessary by the public.

4.3 Housing in Hong Kong

There are three major types of housing in Hong Kong and they will be the focus of this study. They comprise of residential towers, public housing and villas. There are other village types that do exist however; this study will focus on the mentioned three types only. Housing in Hong Kong varies by location and income and more than 7 million people live on about 1,108 km ²(427 mi ²) of land in the region. Hong Kong is divided in to three areas and they comprise of Hong Kong Island, Kowloon and the New Territories. The Hong Kong Island is the most expensive whereas the New Territories in the least expensive. Around 31% of people who live in Hong Kong are to live in public housing and 49.3% is recorded to be living in permanent private housing that is in residential towers, villas and others. During 2004 to 2005 housing expenditures is to have accounted for around a third of average monthly household expenditures with utilities use accounting around 3.4%. Housing is a big issue in Hong Kong because of their unaffordability and house purchasing is one of if not the biggest decision any family makes. The three types of housing are built by different stakeholders with different objectives. Residential towers are built by stakeholders who aim for the middle class and the higher class market whereas villas are built or the high end of the market. Public housing on the other hand are built by the government and their concern is efficiency and meeting demand.

[171] "Feng Shui Consultation, Consultant in Hong Kong."

4.4 Data sets

Residential Towers	Public Housing	Villas
21726 Flats	14862 Flats	848 Flats
5 HK, 5 K, 5 NT	5 HK, 5 K, 5 NT	5 HK, 5 K, 5 NT
15 Apartments Complexes	9 Apartment Complexes	6 Villas

Table 4-1 Data Sets

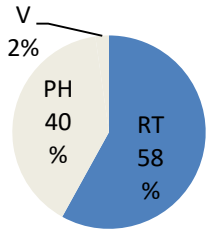
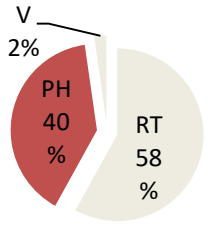
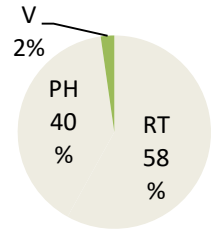
Residential Towers	Public Housing	Villas
		

Table 4-2 Data Sets Proportion Pie Charts

4.4.1 Residential Towers

Name	Zone	No. Flats	Feng Shui P	Environ P
Scenic view	K	33	28	43
Scenic view	K	33	29	41
Scenic view	K	99	30	49
Scenic view	K	66	31	51
Scenic view	K	33	32	56
Scenic view	K	132	33	52.75
Scenic view	K	33	34	67
Scenic view	K	99	35	67
Scenic view	K	99	36	68
Felicity Gardens	HK	46	26	42
Felicity Gardens	HK	230	27	46.4
Scenic view	K	142	31.6	56.99285714
Felicity Gardens	HK	230	29	57
Felicity Gardens	HK	46	30	62
Healthy Gardens	HK	92	29	50
Healthy Gardens	HK	253	30	50.90909091
Healthy Gardens	HK	207	31	50
Healthy Gardens	HK	460	32	65
Healthy Gardens	HK	92	33	67
Island Resort	HK	200	26	47
Island Resort	HK	400	27	47
Island Resort	HK	500	28	51.6
Island Resort	HK	200	29	55
Island Resort	HK	100	30	49
Island Resort	HK	200	31	59.5
Larvotto	HK	378	32	44.90756303
Larvotto	HK	108	33	57.75
Le Sommet	HK	67	29	40.30147059
Le Sommet	HK	100	30	42.20588235
Le Sommet	HK	17	32	45.17647059
Le Sommet	HK	16	33	44.64705882
Hampton Place	K	132	25	42
Hampton Place	K	232	26	43
Hampton Place	K	155	27	44
Hampton Place	K	66	28	50
Hampton Place	K	143	31	61

Hampton Place	K	337	32	65.2
Hampton Place	K	201	33	64.83333333
Hampton Place	K	66	34	68
Island Harbourview	K	760	25	40.9
Island Harbourview	K	754	26	40.19047619
Island Harbourview	K	144	27	49
Island Harbourview	K	514	28	53.64285714
Island Harbourview	K	144	29	54.75
Island Harbourview	K	68	30	56
Manhattan Hill	K	234	20	38.92307692
Manhattan Hill	K	322	21	42.26666667
Manhattan Hill	K	62	22	54
Manhattan Hill	K	94	23	58.8
Manhattan Hill	K	214	24	61
Manhattan Hill	K	172	25	62.625
Manhattan Hill	K	22	26	62
Chevalier Garden	NT	33	28	43
Chevalier Garden	NT	33	29	41
Chevalier Garden	NT	99	30	49
Chevalier Garden	NT	66	31	51
Chevalier Garden	NT	33	32	56
Chevalier Garden	NT	132	33	52.75
Chevalier Garden	NT	33	34	67
Chevalier Garden	NT	99	35	67
Chevalier Garden	NT	99	36	68
The Coronation	K	198	27	45
The Coronation	K	198	28	57
The Coronation	K	165	29	59.8
The Coronation	K	99	30	57.33333333
The Coronation	K	99	31	50
The Coronation	K	99	32	55
Ocean View	NT	84	29	50.4
Ocean View	NT	382	30	52.26086957
Ocean View	NT	84	31	59.4
Royal Ascott	NT	57	28	49
Royal Ascott	NT	636	29	50
Royal Ascott	NT	2014	30	49.97435897
Royal Ascott	NT	2968	31	50.75
Royal Ascott	NT	338	32	65.2
Royal Ascott	NT	1524	33	65.8

Royal Ascott	NT	1704	34	65
Scenery Garden	NT	66	32	47
Scenery Garden	NT	34	33	49
Scenery Garden	NT	33	34	61
Scenery Garden	NT	101	35	62.33333333
The Palazzo	NT	594	29	46
The Palazzo	NT	132	30	48
The Palazzo	NT	462	31	49
The Palazzo	NT	33	33	59

Table 4-3 Residential Towers Data Set

4.4.2 Public Housing

Name	Zone	No. Flats	Feng Shui P	Environ P
Fung Wah Estate	HK	100	30	41
Fung Wah Estate	HK	217	31	42.23076923
Fung Wah Estate	HK	183	32	44
Fung Wah Estate	HK	134	34	58
Hing Tung Estate	HK	76	28	42
Hing Tung Estate	HK	418	29	44.81818182
Hing Tung Estate	HK	418	30	48.36363636
Hing Tung Estate	HK	532	31	54
Tsui Wan Estate	HK	167	29	43
Tsui Wan Estate	HK	466	30	46.92857143
Tsui Wan Estate	HK	200	31	50
Tsui Wan Estate	HK	50	32	51
Tsui Wan Estate	HK	134	33	62.5
Tsui Wan Estate	HK	183	34	64
Fu Cheong Estate	K	99	27	40
Fu Cheong Estate	K	502	28	41.4
Fu Cheong Estate	K	500	29	43.2
Fu Cheong Estate	K	99	30	45
Fu Cheong Estate	K	199	31	57
Fu Cheong Estate	K	201	32	59
Hoi Fu Court	K	504	27	40
Hoi Fu Court	K	900	28	41.92

Hoi Fu Court	K	288	29	43.375
Hoi Fu Court	K	36	30	45
Hoi Fu Court	K	72	31	56
Hoi Fu Court	K	468	32	57.38461538
Hoi Fu Court	K	324	33	59.11111111
Lai Kok Estate	K	228	29	43
Lai Kok Estate	K	132	32	58
Lai Kok Estate	K	120	33	59
Long Ping Estate	NT	175	27	43
Long Ping Estate	NT	675	28	42.77777778
Long Ping Estate	NT	800	30	56.78125
Long Ping Estate	NT	650	31	59.15384615
Long Ping Estate	NT	275	32	61.18181818
Long Ping Estate	NT	25	33	63
Tai Ping Estate	NT	546	28	44.71428571
Tai Ping Estate	NT	338	29	43.46153846
Tai Ping Estate	NT	182	30	44
Tai Ping Estate	NT	52	31	60
Tai Ping Estate	NT	312	32	59.25
Tai Ping Estate	NT	26	33	59
Wan Tau Tong Estate	NT	476	26	36.14285714
Wan Tau Tong Estate	NT	1292	27	36.55263158
Wan Tau Tong Estate	NT	408	28	35.66666667
Wan Tau Tong Estate	NT	136	29	51

Table 4-4 Residential Towers Data Set

4.4.3 Villas

Name	Zone	No. Flats	Feng Shui P	Environ P
Imperial Court	HK	42	35	56
The Astoria	HK	24	30	51
The Astoria	HK	96	31	52

The Astoria	HK	96	33	66
Meridian Hill	K	27	31	50
Meridian Hill	K	36	32	50.25
Meridian Hill	K	9	33	49
Meridian Hill	K	27	34	64
Meridian Hill	K	9	35	63
Sunderland Estate	K	3	34	54
Sunderland Estate	K	6	35	55
Sunderland Estate	K	21	36	64.85714286
Parkside Villa	NT	180	31	49
Parkside Villa	NT	20	32	60
Parkside Villa	NT	160	33	63
The Verdancy	NT	6	30	52
The Verdancy	NT	6	31	53
The Verdancy	NT	18	32	51.14285714
The Verdancy	NT	28	33	58.09090909
The Verdancy	NT	12	34	65
The Verdancy	NT	14	35	66.83333333

Table 4-5 Villas Data Set

4.5 Results Analysis

The following analysis will be done with the data collected. Please refer to the methodology section again for a more detailed explanation. The average number of Feng Shui elements of each type of housing, the average total number of environmental points and the average number of environmental points per Feng Shui principle. The findings will be shared first, then an explanation given for the results, lay out the implications and then explain the significance of the findings.

4.5.1 Average Number of Feng Shui Principles

4.5.1.1 Average Number of Feng Shui Principles of each type of housing

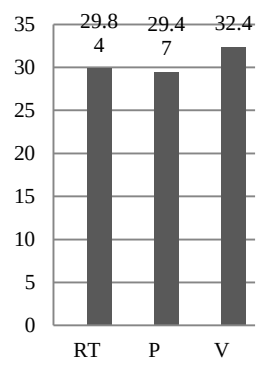
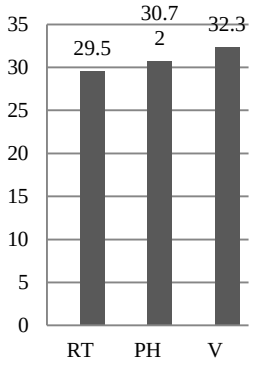
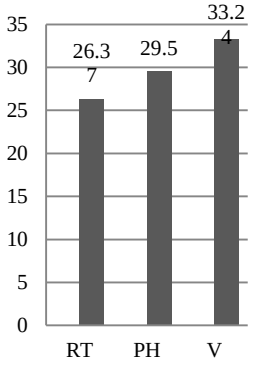
Hong Kong Island	Kowloon	New Territories
		

Table 4-6 Average number of Feng Shui principles in the different types of housing in the different zones of Hong Kong

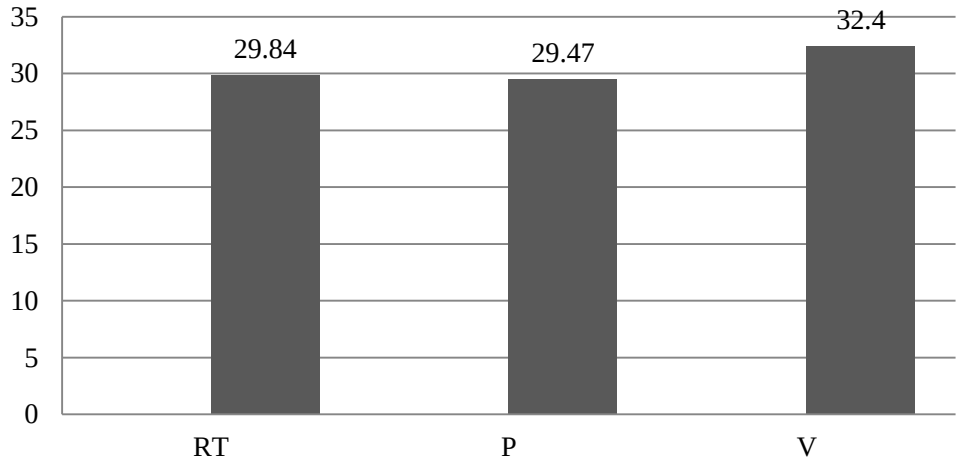


Figure 4-10 Overall Average number of Feng Shui principles in the different types of housing

From the average number of Feng Shui principles analysis it can be seen that villas in average had 3 Feng Shui principles more in average. It was found that Villas performed well in Criteria A which deals with site. Residential tower and public housing estates in average fulfilled 70% of all possible Feng Shui principles whereas Villas fulfilled around 75.5% of Criteria A. The principles that villas fulfilled more comprised of A3: It is recommended to have an open field or a garden to the south side of the building., A4: It is recommended that the building is protected by trees, another building or a high ground behind, A5: It is recommended that there is an open and uncluttered area in front of the building. Below is a table showing three villas to reveal why the three Feng Shui principles were better fulfilled in villas rather than in other types of housing.

Meridian Hill (Villa) Block 3 Ground floor plan	The Verdancy (Villa) Block 9 Ground floor plan	Imperial Court Block B and Site Plans
		

Table 4-7 Reference Plans of the concerned Residential Towers[172]

[172] "Centadata"

From the examples that are shown it can be seen that on the ground floor the villa complexes have big balconies which the ground floor flats enjoy. This ensures that the all the flats have uncluttered spaces in front and have better views. It is also important to notice that unlike tower blocks of residential towers and villas there are only a few flats which allow more of the villa tower flats to have a better orientation which is south. Villas are to have achieved the "It is recommended to have an open field or a garden to the south side of the building" principle way better than the other types. This can be attributed to the areas where villas are usually built. They are usually built in the New Territories which is the north area of Hong Kong and is an area where more woodland and protected natural zones of the city are present.

Table 1 Maximum Domestic Plot Ratios – Main Urban Areas

Density Zone	Type of Area	Location	Maximum Domestic Plot Ratio	Notes
R1	Existing Development Area	Hong Kong Island	8/9/10	(i) (ii)
		Kowloon & New Kowloon	7.5	(iii) (iv)
		Tsuen Wan New Town (covers Tsuen Wan, Kwai Chung & Tsing Yi Island)	8	(ii) (v)
	New Development Area and Comprehensive Development Area		6.5	(vi) (vii)
R2			6	(viii) (ix)
R3			3.6	(viii) (ix)

Figure 4-11 Maximum Domestic Plot Ratios[173]

According to Reg 21(3) of the Building (Planning) Regulations (Cap 123F), the plot ratio of a building is obtained by dividing the gross floor area (GFA) of the building by the area of the site on which the building is erected. For instance when a building has 12 floors where each floor is 1,500 square metres, the GFA of the building will be 18,000 square metres. When the the site area is 2,000 square metres the plot ratio is calculated as 9. A higher plot ratios mean that buildings are built more densely

[173] Planning Department, "Residential Densities.",16.

and this causes buildings to be built in more efficient ways as the taller the building the higher the construction costs. On the other hand a lower plot ratio allows developers more flexbility on the ground floor as the buildings will not have to be built too high in order to build to the maximum plot ratio which is usually done to maximize profits. This has caused Residential towers to be built with poor site conditions with minimal open spaces.

4.5.1.2 Average Number of Feng Shui Principles of each category of all flats

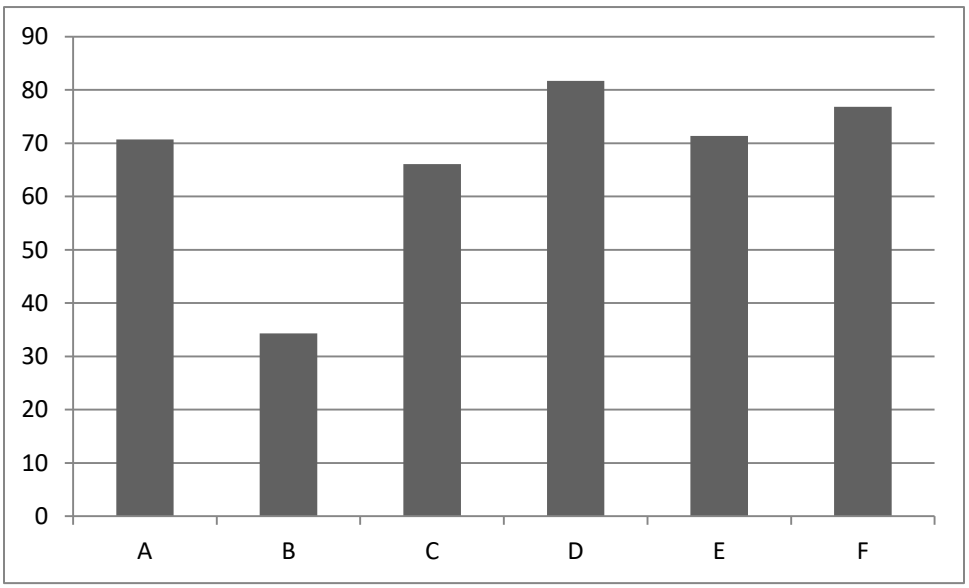


Figure 4-12 Average percentage of total Feng Shui Criteria fulfilled in Residential Towers

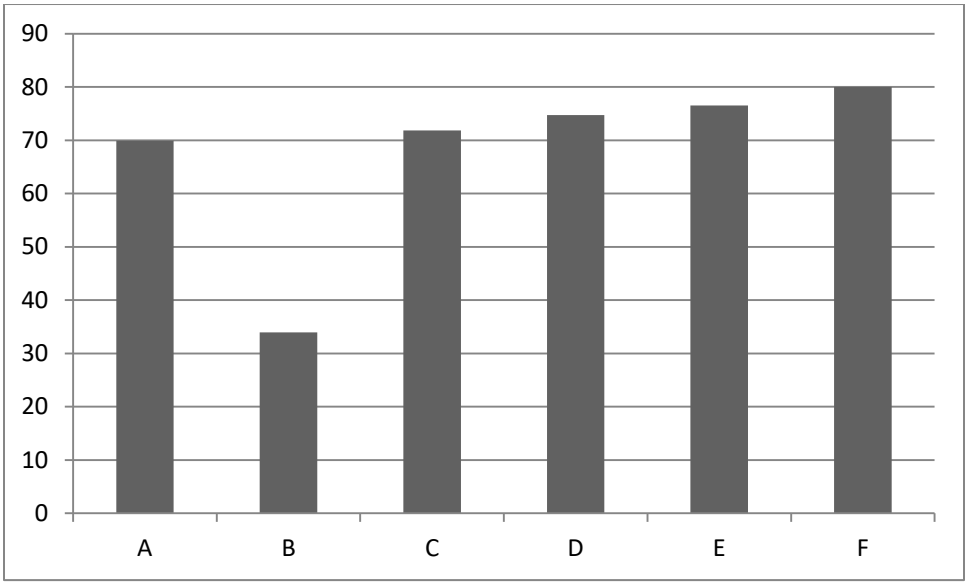


Figure 4-13 Average percentage of total Feng Shui Criteria fulfilled in Public Housing

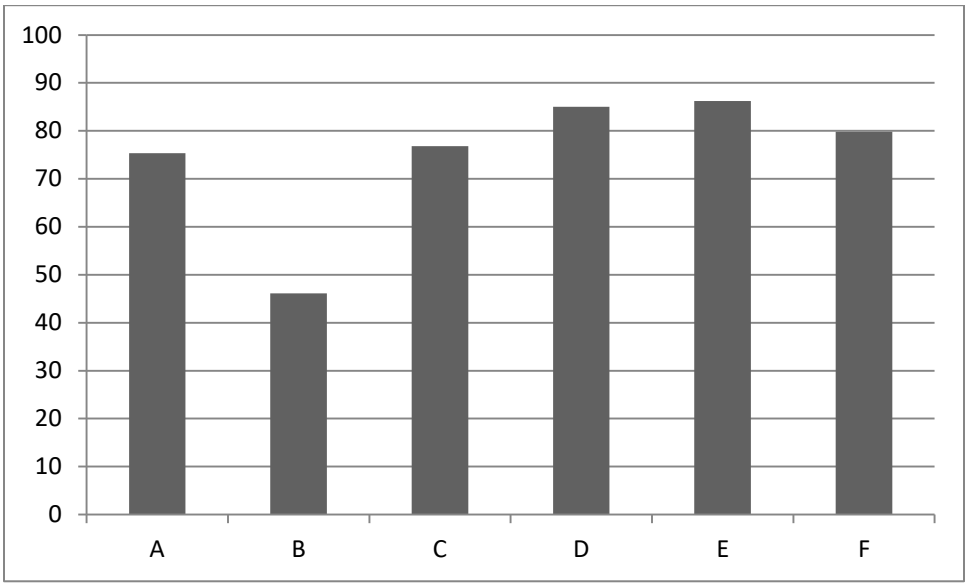


Figure 4-14 Average percentage of total Feng Shui Criteria fulfilled in Villas

Public housing was the worst performer when it came to the average number of Feng Shui principles and it performed exceptionally poorly in Criteria D. Criteria D dealt with site features and the principles that were of interest were - D3: It is recommended that the building has a view of water features, artificial will do - D5: It is not recommended for the building to be overshadowed or overlooked by taller buildings. D5's Feng Shui principle specification was; there are no directly opposite flats within the separating distance of 7.5m (projected façade of building to site boundaries) that is over equal or taller height than the subject flat concerned.

There has been a slow increase in the floor area of the public housing estates and efforts have been made to improve the interior space over the years but the exterior layout still needs improvement. However, the high demand of public housing makes this difficult to achieve as every block needs to be built to its maximum height for maximum output. Their site features is a problem as this can be seen to have been the result of the distribution of relatively lower quality land to public housing estate projects. As land is expensive in Hong Kong it is normal to expect that the less desirable plots are used to build public housing estates. The government also makes revenue from selling land to developers so it is also in their interest as well sell the more prime plots to developers of the private sector.

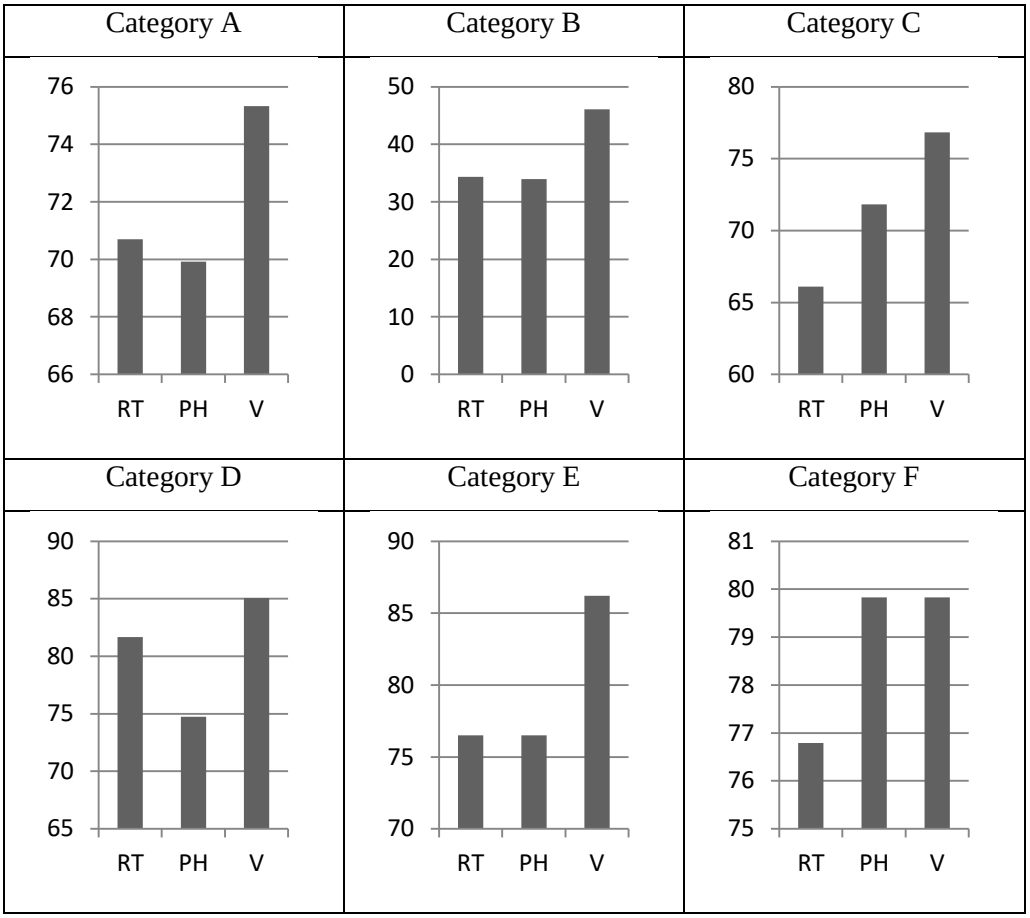


Figure 4-15 Average percentage of total Feng Shui Criteria Categories fulfilled by the different types of housing in Hong Kong

4.5.1.3 Average Number of Feng Shui Principles of each overarching category of all flats

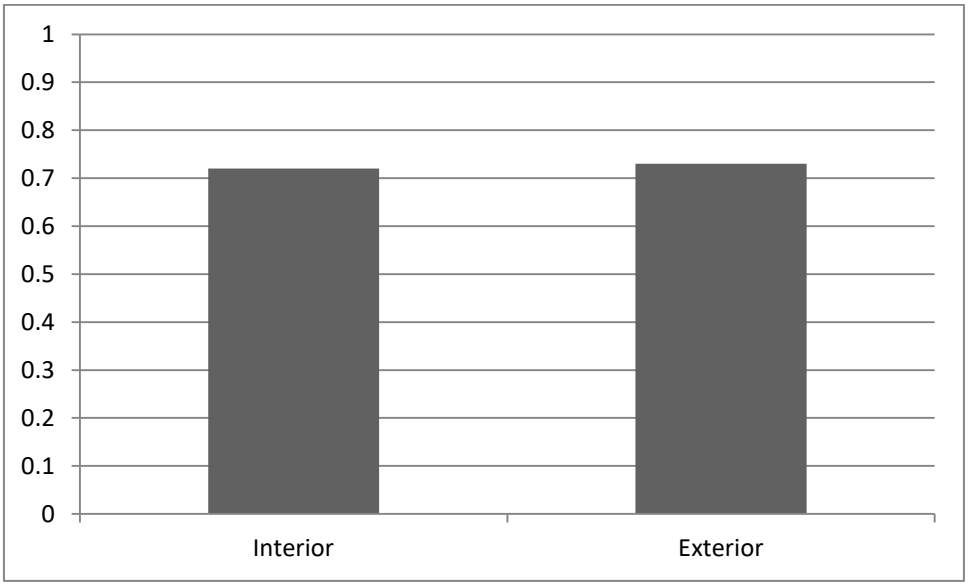


Figure 4-16 Average percentage of total Feng Shui Criteria Overarching Categories fulfilled by Residential Towers

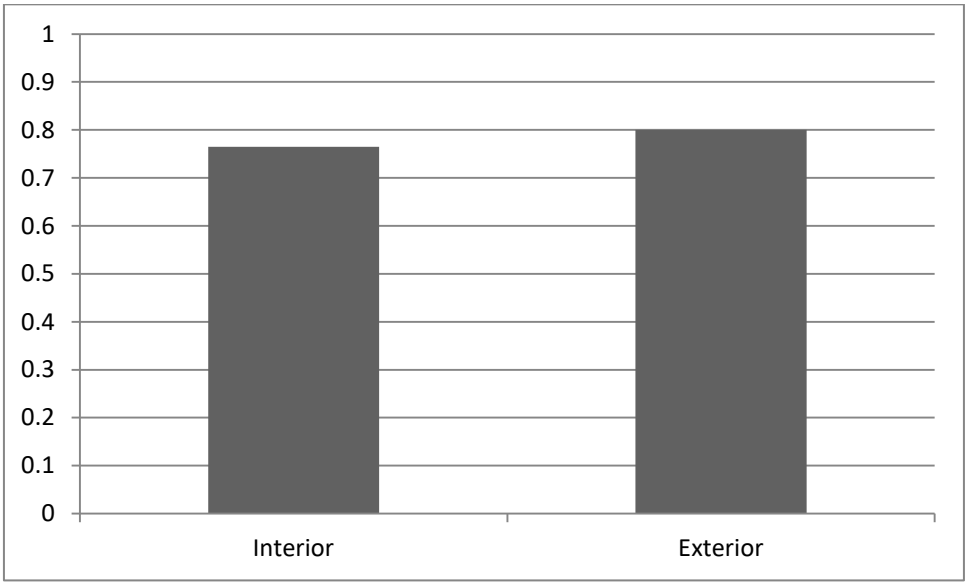


Figure 4-17 Average percentage of total Feng Shui Criteria Overarching Categories fulfilled by Public Housing

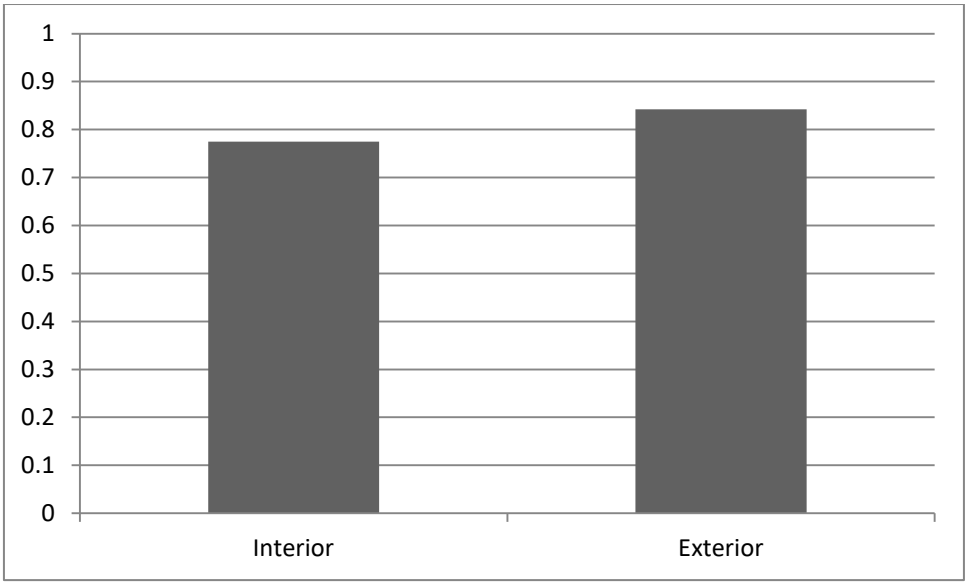


Figure 4-18 Average percentage of total Feng Shui Criteria Overarching Categories fulfilled by Villas

4.5.1.4 Average Number of Feng Shui Principles of each zone

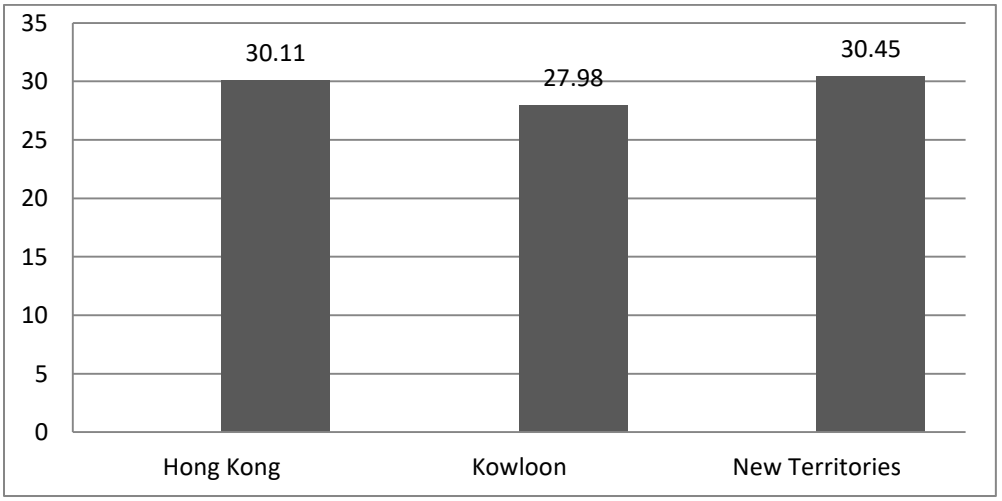


Figure 4-19 Average Number of Feng Shui principles of each zone in Hong Kong

4.5.2 Average Total Environmental Points

4.4.2.1 Average Number of Environmental Points of each type of housing

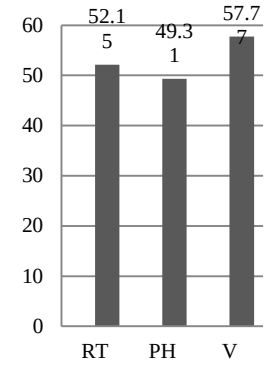
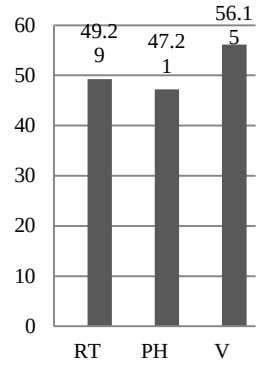
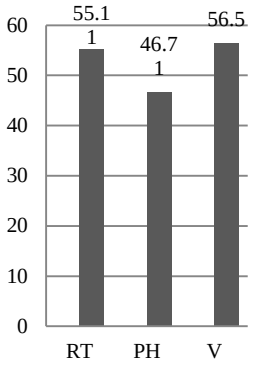
Hong Kong Island	Kowloon	New Territories
		

Table 4-8 Average number of Environmental Points in the different types of housing in the different zones of Hong Kong

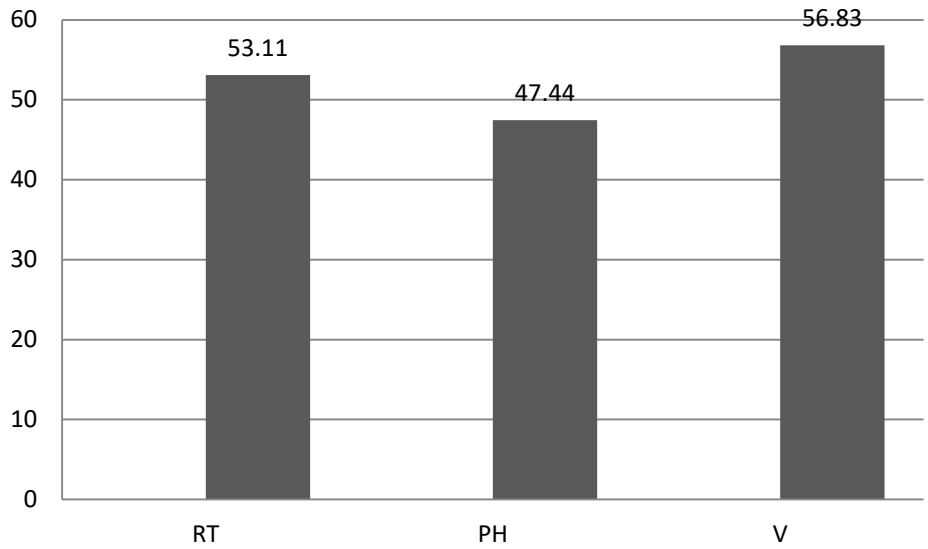


Figure 4-20 Overall average number of Environmental Points in the different types of housing

4.4.2.2 Average Environmental Points of each category of all flats

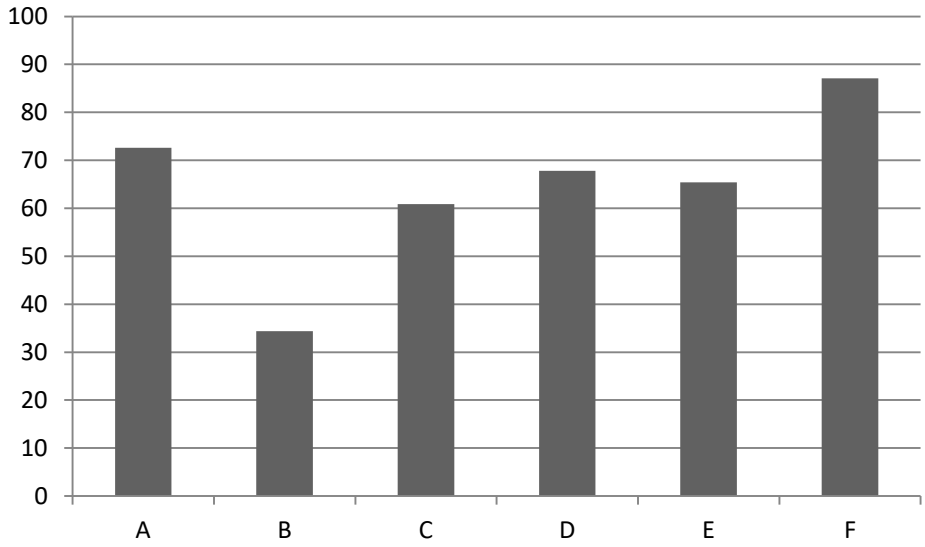


Figure 4-21 Average percentage of total possible Environmental Points fulfilled in Residential towers

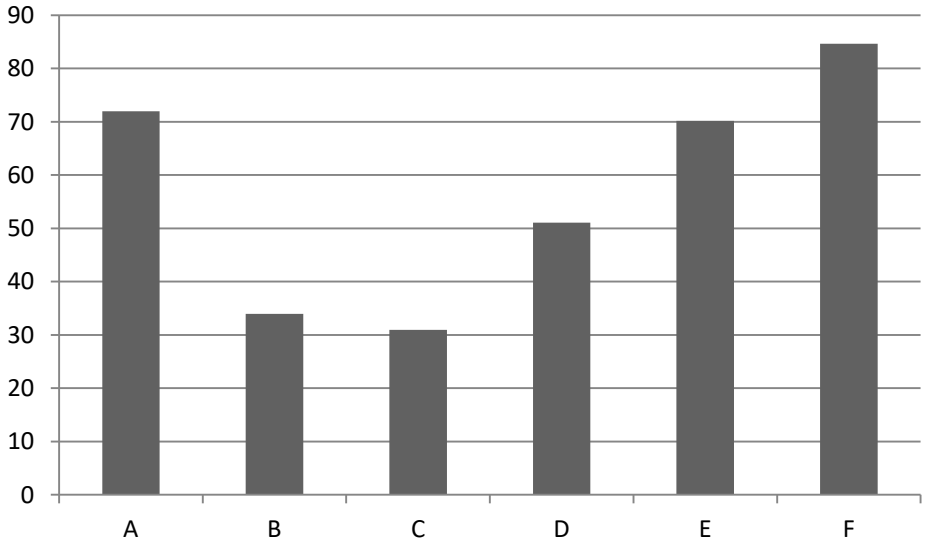


Figure 4-22 Average percentage of total possible Environmental Points fulfilled in Public Housing

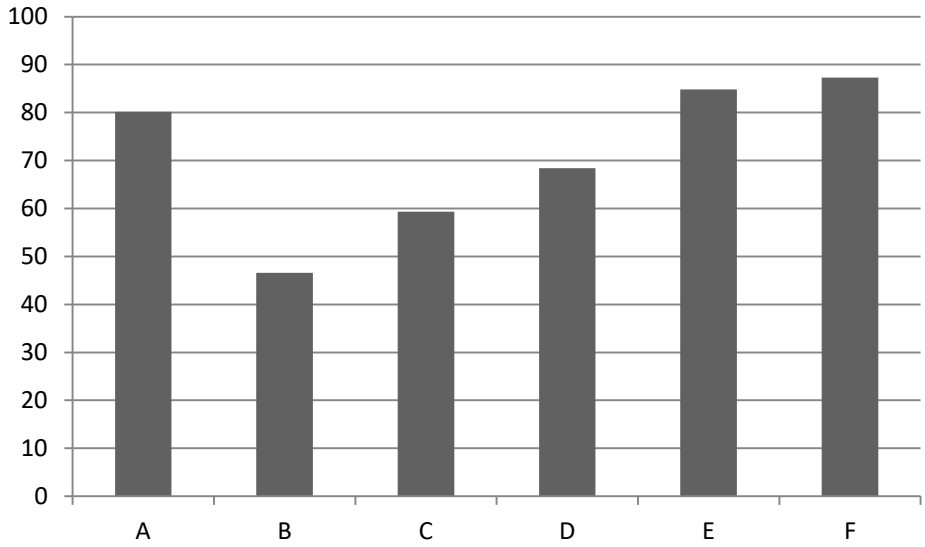


Figure 4-23 Average percentage of total possible Environmental Points on fulfilled in Villas

The graphs above are interesting in that they show how the different types of housing in Hong Kong performed in each of the categories of the Feng Shui criteria. All three performed with similar trends and all can be seen to have adhered well in category A, E and F. However, when the graphs are observed meticulously the differences become apparent and interesting areas come to one's attention. In villas from category B to E there is a clear steady increase but this is not the case in Residential towers or Housing estates. Public housing estates can be seen to be performing poorly in many of the categories especially in categories in C and D.

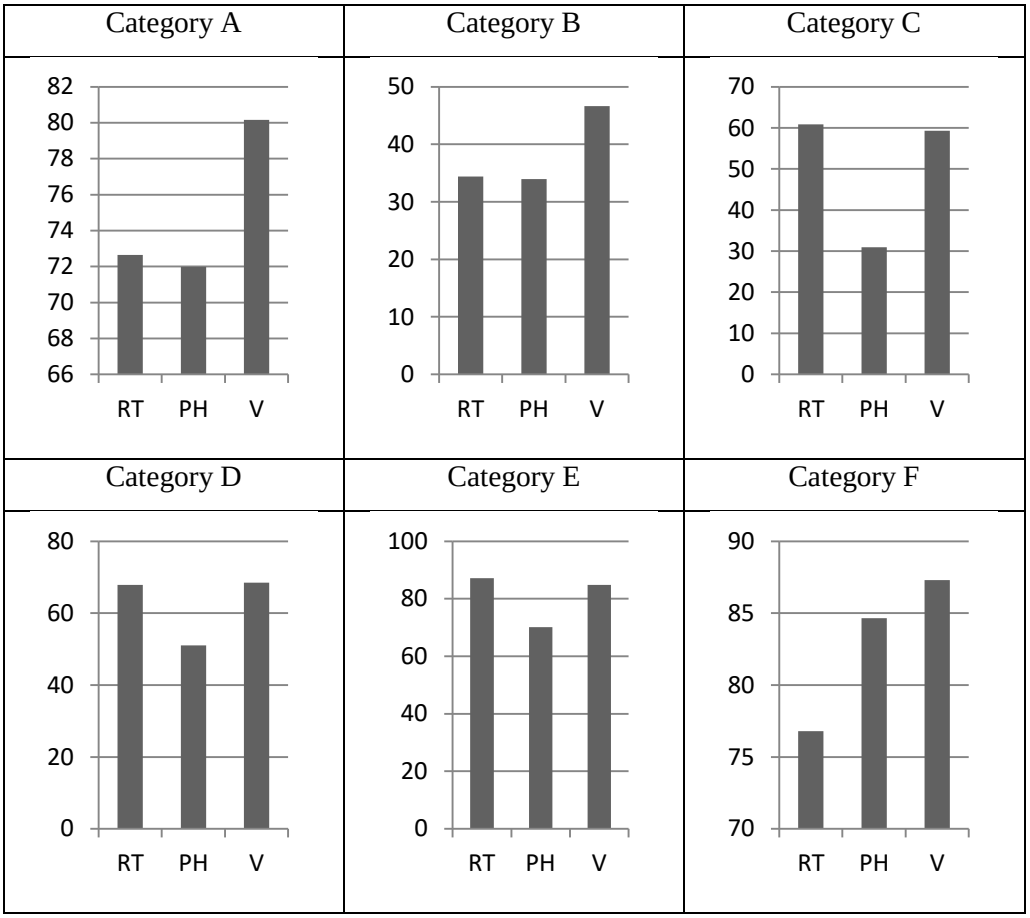


Figure 4-24 Average percentage of total possible Environmental Points of the Feng Shui Categories fulfilled by the different types of housing in Hong Kong

4.4.2.3 Average Environmental Points of each overarching category of all flats

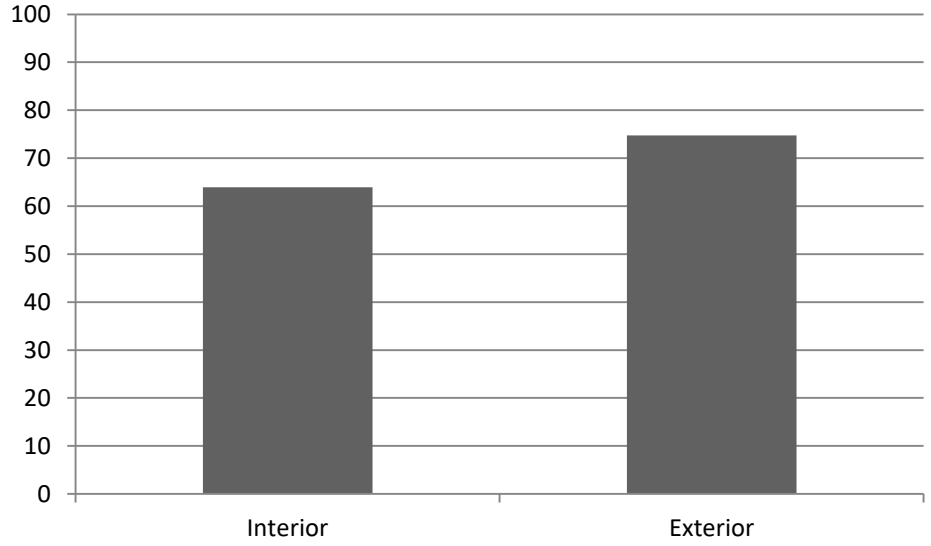


Figure 4-25 Average percentage possible Environmental Points of the Feng Shui Overarching Categories fulfilled by Residential Towers

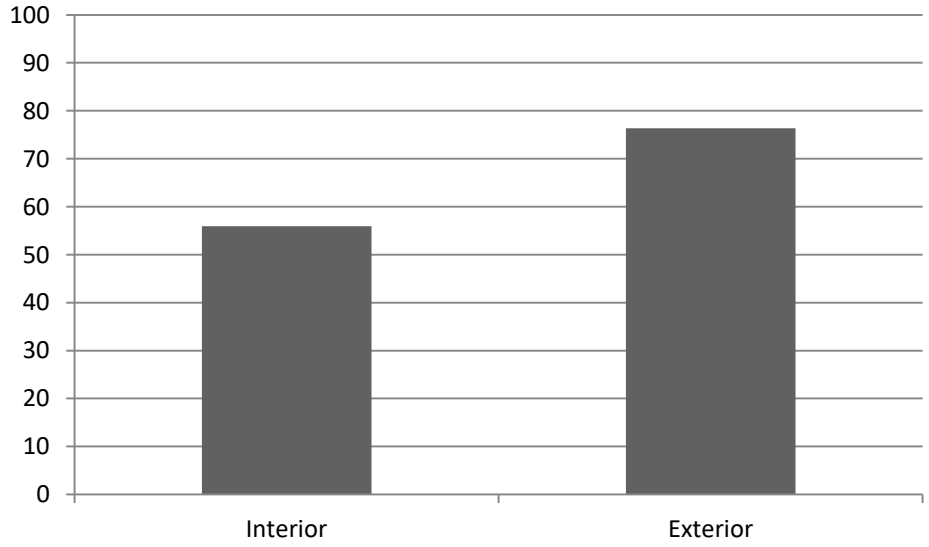


Figure 4-26 Average percentage possible Environmental Points of the Feng Shui Overarching Categories fulfilled by Public Housing

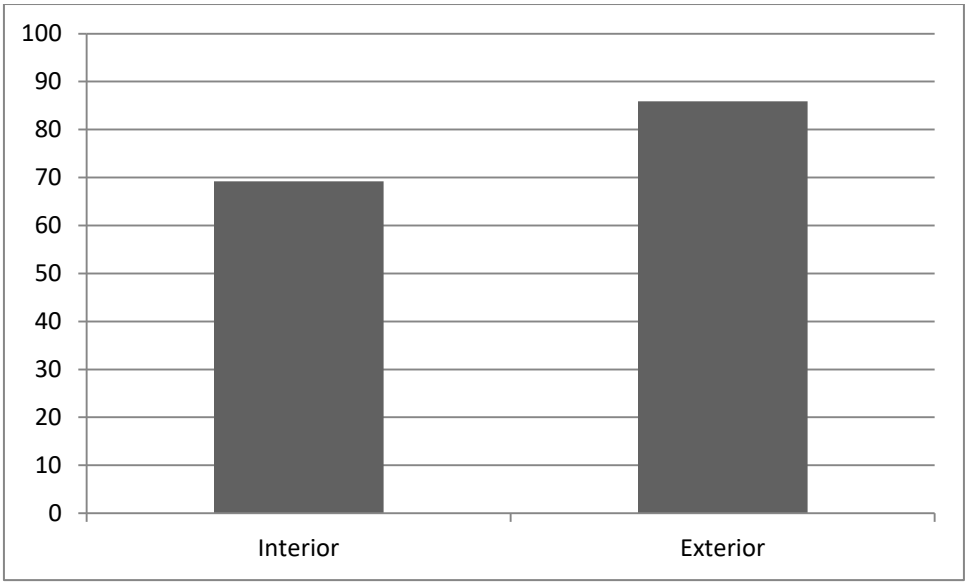


Figure 4-27 Average percentage possible Environmental Points of the Feng Shui Overarching Categories fulfilled by Villas

4.4.2.4 Average Environmental Points of each zone

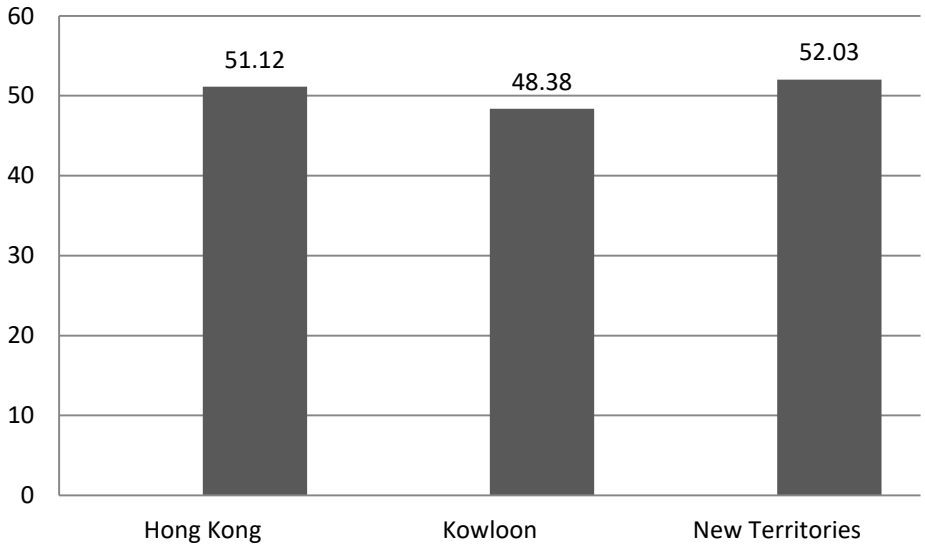


Figure 4-28 Average Number of Environmental points of each zone in Hong Kong

4.5.3 Average Environmental Points per Feng Shui Principle

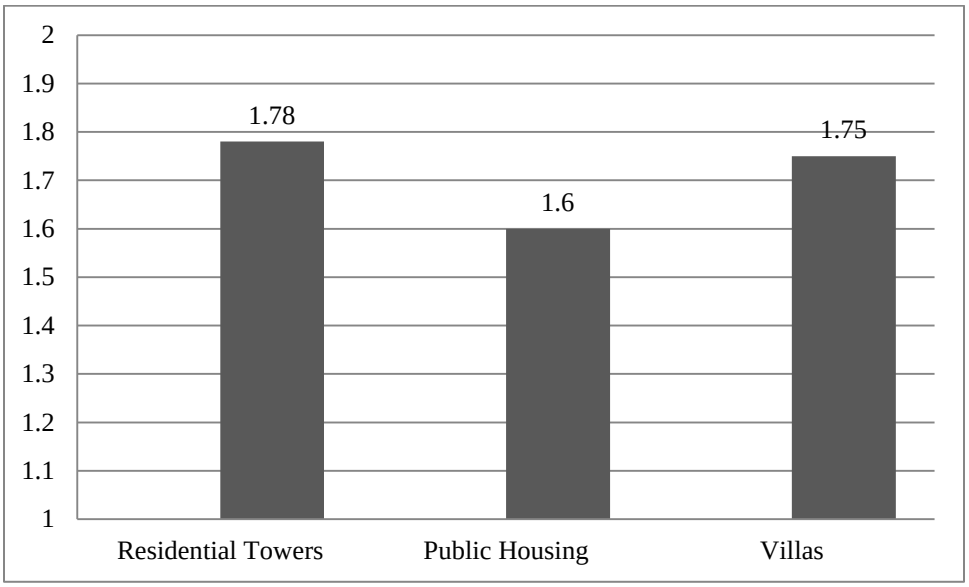


Figure 4-29 Average number of Environmental Points per Feng Shui principles in the different types of housing in Hong Kong

The average environmental points per Feng Shui principle is an important area of study that shows how effective the Feng Shui principles adhered were in the different types of housing. As mentioned in the methodology each of the Feng Shui principles have different environmental implications and are worth different environmental points, and whether the environmental implications hold true were verified by the specifications laid out in 3.4.1. Just because a flat has many Feng Shui principles does not necessary mean that it enjoys more environmental benefits.

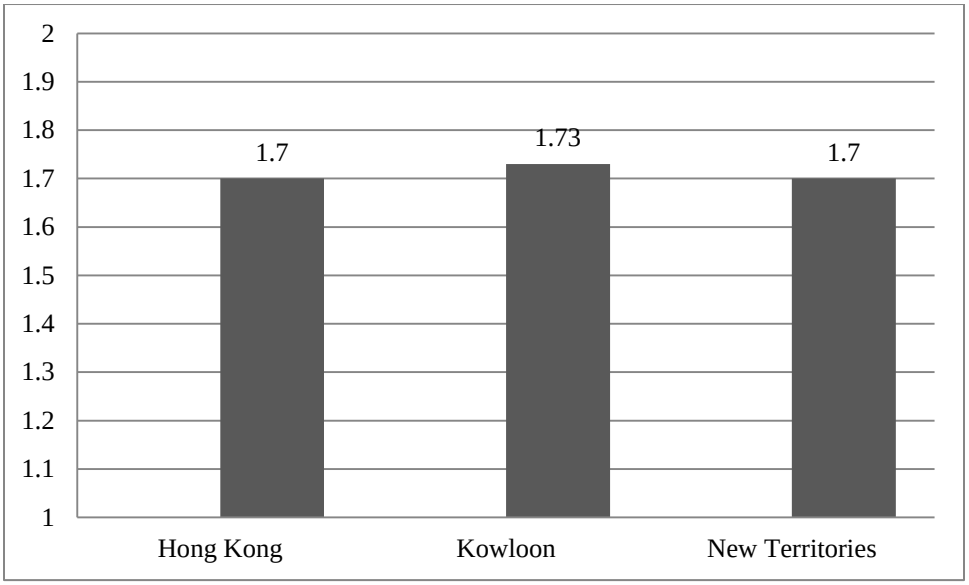


Figure 4-30 Average number of Environmental Points per Feng Shui principles in the different zones of Hong Kong

When it came to comparing the efficiency of the different zones of Hong Kong there was very little difference. Hong Kong and the New Territories had identical scores when it came to the average number of environmental points per Feng Shui principle while Kowloon achieved 0.03 points more which was a meagre difference. However, the differences were apparent in the different types of housing. Residential towers and villas were in the 1.70 level but public housing estates were in the 1.60 level. By looking at which categories the public housing estates failed to perform well we can understand why this was the case, and by finding where there were big difference between the number of Feng Shui principles and the environmental points the problem sources could be identified.

Criteria A - Site

The public housing estates fell behind in the uncluttered area and protection aspects of Site due to the highly optimized estate layouts.

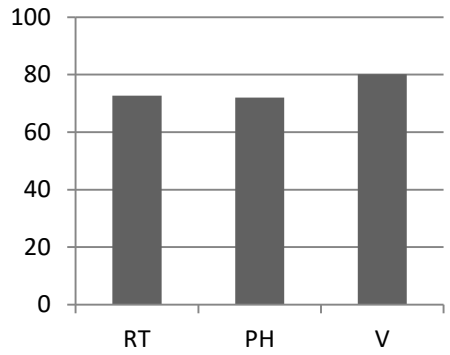


Figure 4-31 Average percentage of all possible Environmental points fulfilled in Criteria A

Criteria D - Site Features

Public estates have a lot of flats that face other flats and that are over towered by other adjacent public estate towers. It's also uncommon for them to have water views as the plots they are built on are usually have poor surroundings.

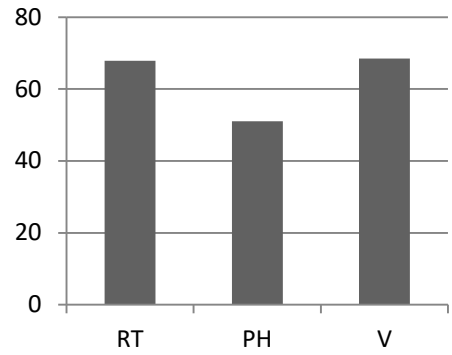


Figure 4-32 Average percentage of all possible Environmental points fulfilled in Criteria D

Criteria C - Street

They also fell behind by at least 30% due to the higher number of cul de sacs and T junctions that exist in many of the public estates in Hong Kong.

Criteria E - Plan Layout

The public estate flats also scored lower by around 15% in average as many did not have windows or doors on both sides due to the flats small sizes.

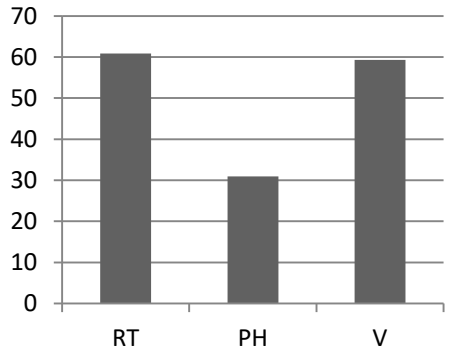


Figure 4-33 Average percentage of all possible Environmental points fulfilled in Criteria C

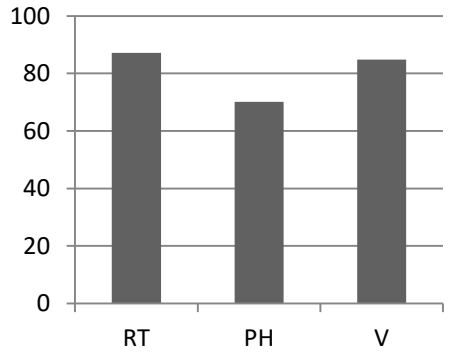


Figure 4-34 Average percentage of all possible Environmental points fulfilled in Criteria E

Summarized in the table above are the categories the public estates scored lowly in the environmental points and the reasons put forward as to explain why this was the case. It can be mostly seen that public housing estates suffered in these areas because of the relatively poorer quality of plots that have been given to them. In some cases multiple types of complexes were built in one estate possibly due to efficiency reasons not only in terms of construction but also in terms of the high demand of these flats from the public. This leads to the buildings to be built on the site in a disordered manner which may have caused the low environmental points.

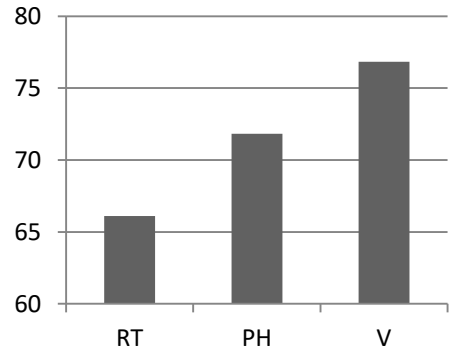
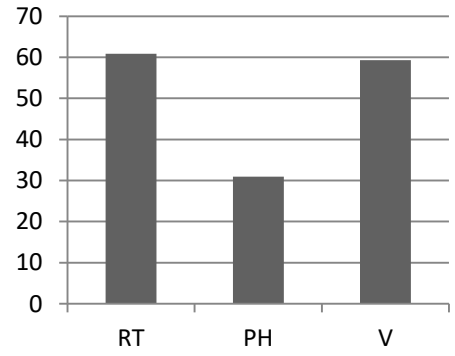
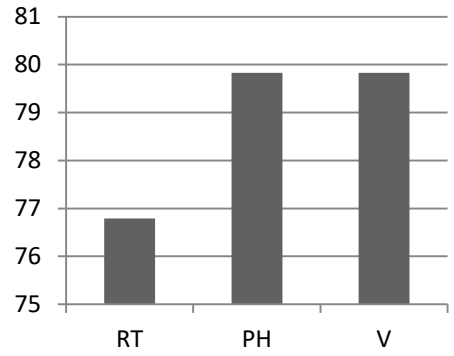
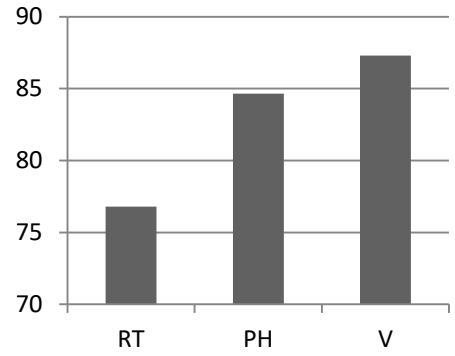
Criteria C Number of Feng Shui elements (Street Layout)	Criteria C Number of Environmental points
	
Criteria F Number of Feng Shui elements (Flat Components)	Criteria F Number of Environmental points, Even if there were openings on both sides they failed to meet the 20 - 30 % ratio to floor area.
	

Table 4-9 Criteria C and F Average number of Feng Shui elements and Average number of Environmental points comparison

Criteria C and F were of high interest because although compared to the other types of housing they achieved high Feng Shui elements but failed to achieve equally high environmental points. Category C was street while F was flat elements where the former has little environmental implications. Public housing failed to do well with principle F2 - It is recommended that the building has a back door that is not aligned with the front door when compared to the other types of housing.

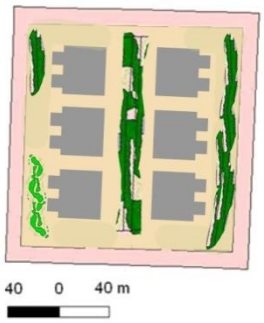
4.6 Morphological Analysis of Homes

Through a morphological analysis the study also takes a step further to understand the Feng Shui situation in the different morphological types of complexes that exist in Hong Kong. The morphological forms established by Peng and Jim in their journal article "Green roof effects on neighborhood microclimate and human thermal sensation" were used.[174] In this section there are several areas that it seeks to understand. It first seeks to understand how the average number of Feng Shui principles differs in each of the established morphological types of homes.

Then as done previously the total environmental points and the efficiency is studied as well. The study will also reveal what morphological forms are preferred to be built by the developers and the government and also see what crossovers exist. The morphological analysis is not the focus of this thesis but a study done to show the role the form of a building plays in affecting its adherence to Feng Shui principles. As the different stakeholders choose to build a certain morphological form its Feng Shui adherence and hence the environmental implications are determined. Efficiency is another story altogether that is delved upon later in this section.

[174] Peng and Jim, "Green-Roof Effects on Neighborhood Microclimate and Human Thermal Sensation."

4.6.1 Morphological Forms in Hong Kong

A. Diverse small scale towers that are separate. Example used: Kowloon Tong	B. Identical/similar small scale towers that are separate.
	
C. Diverse larger scale towers that are separate (Multiple complexes) Example used: Broadcast	D. Identical/similar larger scale towers that are separate (Example used: Chun Man
	

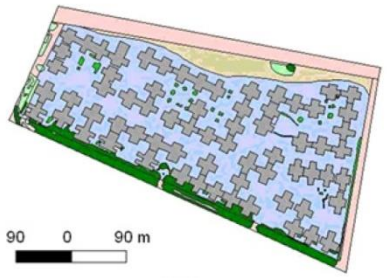
E. Identical/similar smaller scale towers that are linked to each other (Within 1 complex) Example used: Mei Foo	
	

Table 4-10 Morphological Forms Code, Description & Example [175]

4.6.2 Data set

A	B	C
Long Ping (PH)	Healthy Gardens (RT)	Tsui Wan (PH)
Imperial Court (V)	Chevalier Garden (RT)	Hoi Fu (PH)
Sunderland Estate (V)		Tai Ping (PH)
Parkside Villa (V)		Larvotto (RT)
D		E
Fung Wah (PH)	Manhattan Hill (RT)	Lai Kok Estate (PH)
Hing Tung (PH)	Olympic City (RT)	The Coronation (RT)
Fu Cheong (PH)	Scenic View (RT)	The Palazzo (RT)

[175] Peng and Jim, "Green-Roof Effects on Neighborhood Microclimate and Human Thermal Sensation.", 600.

Wan Tau Tong (PH)	Ocean View (RT)	Meridian Hill (V)
Felicity Gardens (RT)	Royal Ascot (RT)	The Verdancy (V)
Island Resort (RT)	Scenery Garden (RT)	
Hampton Place (RT)	The Astoria (V)	

Table 4-11 Morphological Form Data Sets

Below are three pie charts showing the different morphological forms the stakeholders of the different types of housing chose to use for the housing complexes. In average form D was the most common and it was the most common morphological form seen in Residential Towers and Public Housing. What's interesting to note is that Villas were the least diverse when it came to forms and type B was not seen in public housing and villas. Type B is the form called Identical/similar small scale towers that are separate. Residential towers did not have form type A which is called diverse small scale towers that are separate. Villas also had a form that was exclusively not present which was C Identical/similar smaller scale towers that are linked to each other.

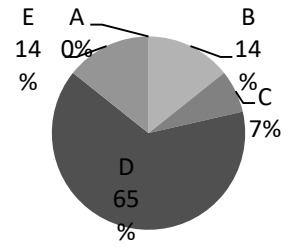
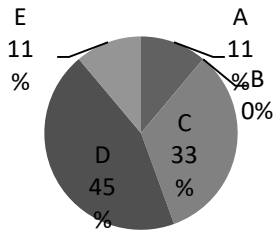
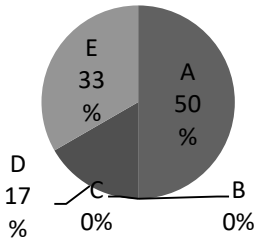
Residential Towers	Public Housing	Villas
		

Table 4-12 Pie Charts showing the proportion of morphological forms in the different types of housing

4.6.3 Data Results

The results were interesting in that it showed which morphological form adhered to more Feng Shui principles and was the most efficient. This analysis made it clearer why public housing estates had less environmental points than the other types of housing. The choice of morphological form by the stakeholders played a large role in determining the number of Feng Shui principles adhered to and the environmental implications that hence followed.

4.5.3.1 Average number of Feng Shui elements of each morphological form

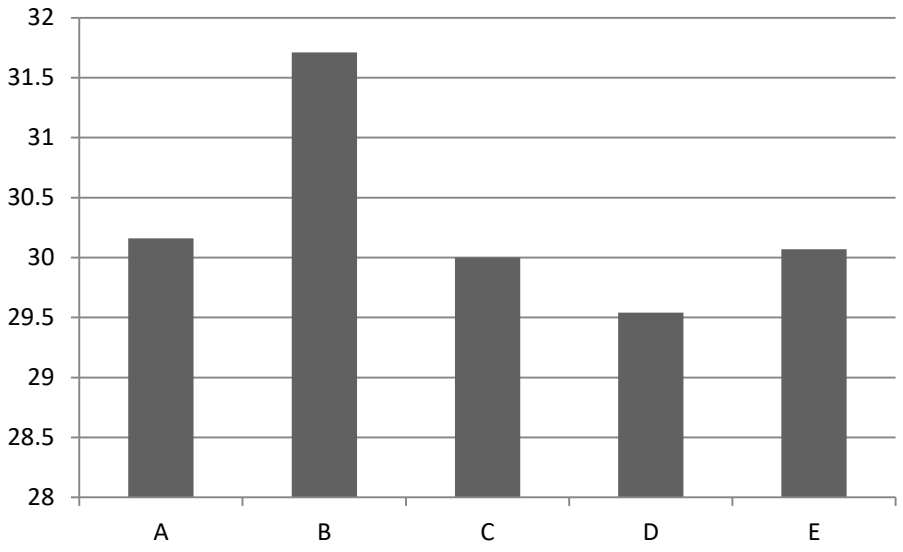


Figure 4-35 Average number of Feng Shui elements of each morphological form

Type B which was called Identical/similar small scale towers that are separate had on average 1.5 Feng Shui principles more than the other types which all had around in average 30 Feng Shui principles. Type D was the worst performer which was Identical/similar larger scale towers that are separate (Within 1 complex). It is interesting to note that no public housing estates that were sampled were of type B. This means that the government's choice to not build type B form has affected the Feng Shui principles of public housing estates. Healthy gardens which is in the type B form category's site plan and building plans are shown below.

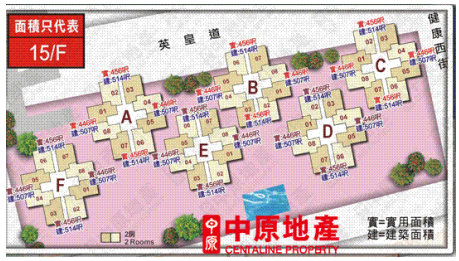
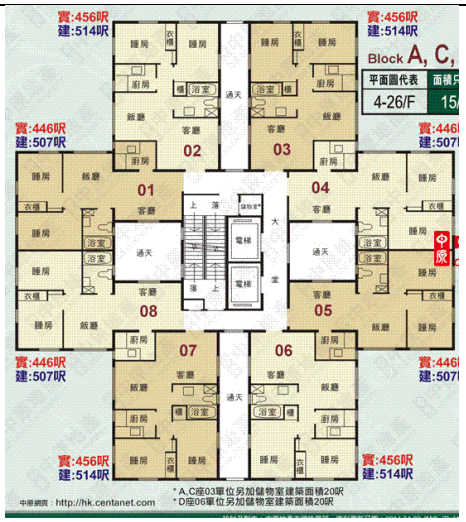
Healthy Gardens (Hong Kong Island) Site Plan	Healthy Gardens (Hong Kong Island) Building block A,C,D plan
	

Table 4-13 Concerned architectural site plans and plans of Healthy Gardens

Source: Centadata [176]

[176] "Centadata"

The B form given that the towers are small in scale there are more towers and hence have more surface area facing the south orientation or open spaces. The need for a north and south opening is crucial as well and by having numerous smaller scaled towers this can be achieved. If there are many flats on each of the floors of a tower than the core of the tower has to be enlarged which means that many of the flats will only have openings facing one direction. If the core is smaller and preferably be square then the flats on the sides have a north and south or east and west exposure which is also allows cross ventilation to occur which is a Feng Shui principle.

Manhattan Hill, Residential Tower, Kowloon Site Plan

Island Harborview, Residential Tower, Kowloon Site Plan

Table 4-14 Site plans of Manhattan Hill and Island Harborview

Source: Centadata [177]

[177] "Centadata"

The worst performing morphological type when it came to the average number of Feng Shui elements was D which was Identical/similar larger scale towers that are separate. It's interesting to note that the majority of flats with the exception of villas took the D morphological form. 65% of Residential towers took this form and some of the apartment complexes examples comprise of Manhattan Hill and Island Harborview. As mentioned previously when there are many flats placed on each of the floors of a tower than the core of the tower has to be enlarged which was the case especially with Manhattan Hill. If the towers were smaller then given that it has fewer flats they can enjoy better orientations as well. Facing south is a Feng Shui principle and from the site plans it can be seen that many flats of the apartment of the morphology D did not adhere to this. This can be seen to be one of the major reasons as to why form D had such a low number of Feng Shui elements.

However, although facing south is an important element that yields a high number of environmental points Public Housing had the lowest efficiency although it had 20% less D forms than Residential Towers. This can be seen as it had no B form public housing estates within the dataset gathered. The B form allows more flats to have better orientation which as mentioned is very efficient and hence allow cross ventilation and better positioning of the kitchen. Either having too much form D or too few form B seem to be equal in effect.

4.5.3.3 Average number of Environmental and average number of Environmental points per Feng Shui for each morphological form

Previously it has been mentioned that the average number of Feng Shui elements of public housing estates and residential towers were similar as both hovered around the 30 Feng Shui principles mark but had very different efficiency ratios. Residential towers achieved in average 1.78 Environmental points per Feng Shui principle while Public Housing estates achieved 1.6 Environmental points per Feng Shui principle which was far lower. Villas achieved 1.75 Environmental points per Feng Shui principle similar to Residential Towers.

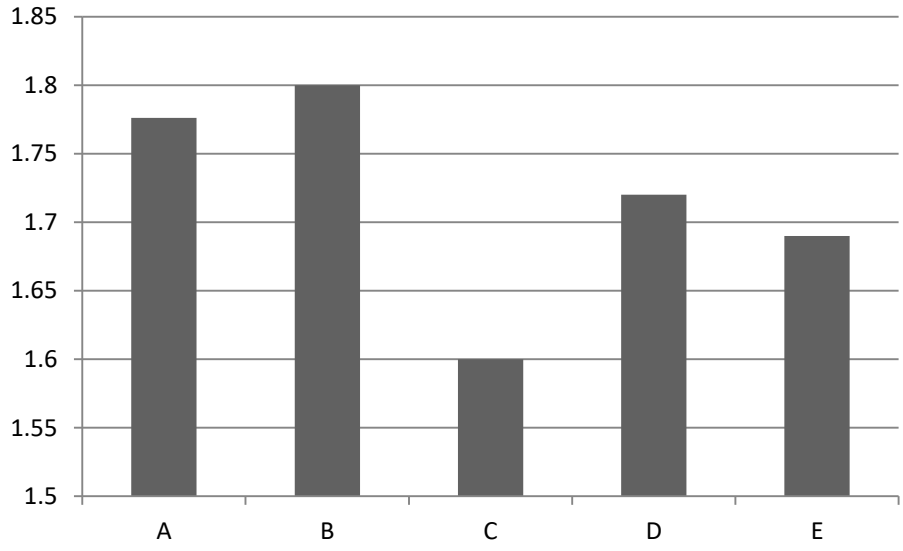


Figure 4-36 Average number of Environmental points per Feng Shui element of different morphological forms

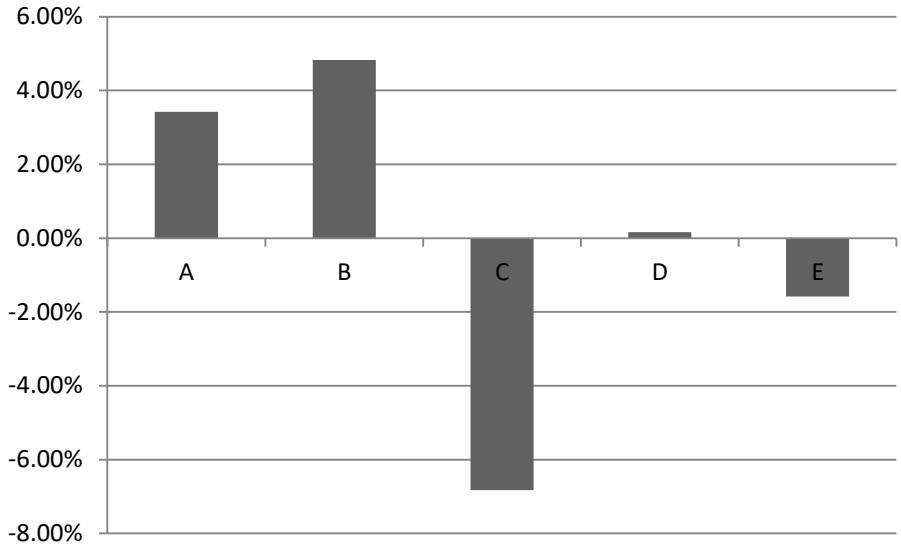


Figure 4-37 Average number of Environmental points per Feng Shui element of different morphological forms percentage difference to average of all morphological forms

Morphological Form C which was Diverse larger scale towers that are separate had the lowest efficiency ratio and as mentioned before had in average the second lowest number of Feng Shui elements. This is interesting as this may explain why Public housing estates achieved such a low efficiency rate. A mere 7% of Residential Towers had form C while Villa had no form C cases at all. But a third of public housing estates had this form. In other words even if a house follows good environmental principles, as following Feng Shui principles allow it to do so, if the building complex is of form C which is Diverse larger scale towers that are separate it is difficult for the flats to enjoy the environmental implications.

Then why does morphological form C have such a low efficiency ratio? We will take the example of Hoi Fu estate. The estate has five different types of blocks and they comprise of Harmony 1, Senior Citizens, Small household block and New Harmony. The estate houses 2800 households and the estate had two intakes of applicants, once in 1999 and another in 2004.

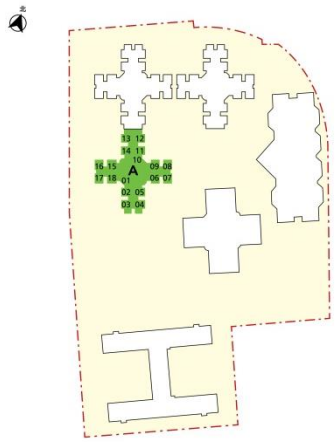
Site plan of Hoi Fu Estate	Image of Hoi Fu Estate
	

Table 4-15 Hoi Fu Estate

Source: Hong Kong Housing Authority [178], University of Edinburgh [179]

The estate had Feng Shui elements C2, E7 and C3 which are of interest. All three caused the estate to have a low efficiency ratio. The first was "It is not recommended for a building to be built in front of a narrow street". Whether morphology C had a tendency to have more narrow streets is not verified but given the diverse type of buildings it will be difficult to keep the streets that enter the estate consistent. E7 was "It is recommended for the building to have a regular shape" which had 0 in terms of environmental points, however the majority of Residential towers and Public Housing estates took this form too. The only thing to note though is that there is a tendency for public housing to be more rectangular and efficient than the other counterparts. C3 was "It is recommended for the main road to be on the west side of the building" which had no environmental significance yet was a recognized Feng Shui principle. The morphological form of a housing estate affects the efficiency ratio to a great degree.

[178] "Housing Authority Property Location and Profile | Hong Kong Housing Authority and Housing Department."
[179] "Hoi Fu Court | Tower Block."

5. Conclusion

Feng Shui is a body of study prospective buyers in Hong Kong consider before making a purchase. However, although there is a sense of understanding among the consumers in Hong Kong that Feng Shui can bring environmental benefits it is not fully understood. In addition many have a vague idea of what the Feng Shui principles are many put a lot of significance and value to them. This thesis study had several objectives but its primary objective was to help those who are in to the study of Feng Shui and buy houses according to it. The thesis, of course goes further than this but this was its main objective. The main objective was to inform the consumers the exact environmental implications that exist in Feng Shui and help them to realize that if they are to enjoy the environmental benefits they think they are getting to think again and do a thorough environmental assessment. The thesis looked at how the different categories of housing and the different morphological types of housing can affect their adherence to Feng Shui and hence the environmental implications. Furthermore the thesis makes it clear that just because one flat follows one Feng Shui principle this does not mean that it will enjoy the presumed environmental benefits that hold true theoretically.

The three types, Residential towers, Public housing and Villas were chosen because they were ultimately built by different stakeholders with different objectives. Like in Chang's paper which looked at the different types of housing. The different objectives of the stakeholders, what they want to achieve, the cash flow they want to see, what the target market is, all this will affect the design, efficiency, radicalness and other areas of a building. What's more the developers understand the value of Feng Shui and know that the consumers in Hong Kong look for it. Hence, certain developers who aim for the high end consumers will be willing to sacrifice some level of efficiency, which is a big deal in Hong Kong where land is so scarce yet demand is so high, to accommodate the desire for those consumers who look for good Feng Shui. Good orientation, openings at the south and north

ends and other luxuries as uncluttered spaces in front of one's homes are expensive attributes of a home. This is something that stakeholders who are aiming for the markets in the lower spectrum have to forgo in the buildings they plan to construct.

Hence, the thesis aimed to make the differences clear and provide a deep insight in to which categories of the Feng Shui criteria they do well at or not and then find the reasons why. After finding the reasons why the efficiency, that is the number of environmental points per Feng Shui principle, or the number of Feng Shui principles was of this level for this type of housing. Then from all this recommendations can be given. In a dense city like Hong Kong it is imperative that homes are designed in efficient ways that are environmentally friendly which will not only benefit the inhabitants but in the long term the society as a whole. It should be a right for every citizen rich or poor to enjoy environmentally healthy homes. However, the consumers in Hong Kong do not understand this fully but chase after Feng Shui principles in a home which they do not even fully understand.

Before getting in to the results and the major findings it would be helpful to touch upon why Feng Shui has come to have so many environmental benefits and what the link was. Through the analysis of detailed Feng Shui principles and their history through previous studies the thesis makes a hypothesis as to why this is so. The thesis showed that the link between the environment and the Feng Shui principles was the "human experience". The additional readings gave insight as to how the Feng Shui elements were formulated and it showed that in reality many if not all the Feng Shui elements are a copy of good principles of survival. As mentioned before in reality these Feng Shui principles were a reflection of survival principles.

Many presume that in Feng Shui a site is a site and an artificial intervention has no value but Feng Shui even today modifying the environment to achieve good Feng Shui is frequently practiced. The human experience and understanding what works and doesn't was key to understanding where Feng Shui came from and why it has the environmental implications it have today. As we in the contemporary world live no longer in villages but in flats we will find it difficult to appreciate Feng Shui.

However, in the bigger context Feng Shui should be appreciated for the benefits that it brings. The survival principles allowed those who followed them to become prosperous and hence were deemed as lucky by others. Hence these principles were then readily accepted by Feng Shui as principles to be followed.

It was also understood that because they did not fully understand why this worked scientifically this thesis makes the hypothesis, which was possible through going through a brief history of Feng Shui and its principles in detail, that the Chinese people beheld these principles to be special and hence even divine because back in those days, where reliance on the natural environment was the key although it still is today, survival depended on being in harmony with nature. Below is a table summarizing the concepts of old Chinese beliefs and explanations that explain why each of the concepts was important to human survival.

Feng Shui Fundamental Concepts	**Possible Deriving Source**
Unity between heaven and human	Harmony with the environment is essential as exploitation, damage and harm of it affects the future crops, living conditions and the quality of resources
The five elements cycles	Achieve a balance and encourage appropriate use of materials
Ying and Yang harmony	Balance of two opposing forces so a balance is achieved in daily life
The Form School Model	Design settlements according to nature, in order to physically prosper in it

Figure 5-1 Feng Shui Fundamental Concepts and their possible deriving sources

There is also an aspect very interesting that exists within the five elements cycle because it has practicality to it as well. There are two cycles that allow these five elements to relate to each other. The productive cycle follows the following order. It

is productive for fire to go be with earth, earth to go be with metal, metal to go be with water, wood to go be with fire.[180] If this is observed carefully they are not random either but this thesis makes the hypothesis that this cycle too is derived from the need for survival. For example wood when added to fire increases it, earth is to used create metal and metal is added which is used to balance this out as metal subtracts from wood. Although it is a destructive cycle this thesis notes that actually wood goes well with metal and putting them together makes it a strong structure tat is not too expensive as there is a wood composition yet sturdy due to the steel joining everything together. Now having understood where Feng Shui came from and why it has the environmental implications as laid out in this thesis it has now come to a point where findings that can help the consumers need to be looked at.

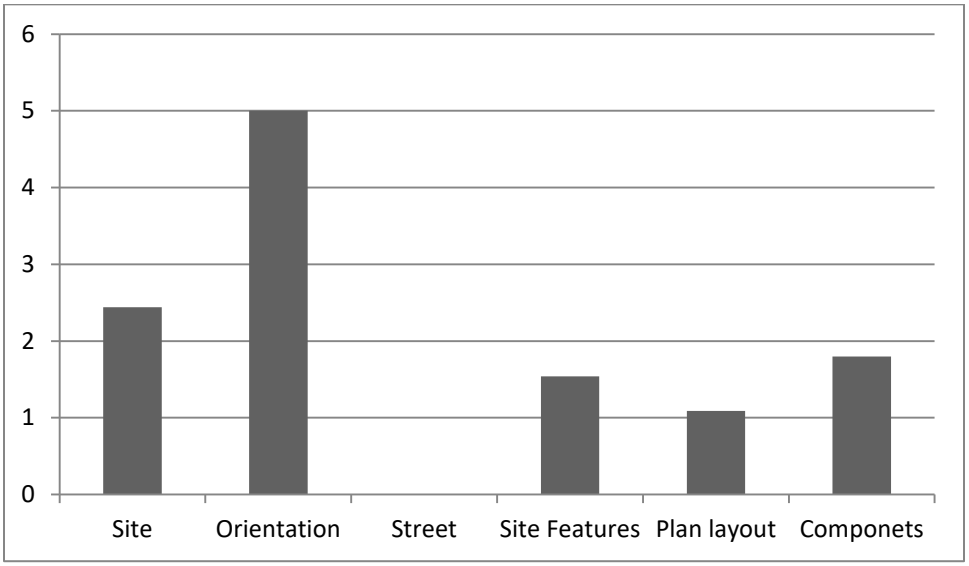


Figure 5-2 Average number of potential environmental points of each Feng Shui criteria category

The thesis made some interesting findings those consumers who look for Feng Shui elements should understand. First of all, what environmental implications existed for each of the Feng Shui criteria categories were looked at. It would be helpful to understand that although Feng Shui principles are deemed equally important by the scholars not all have the same potential environmental weightings. Orientation had

[180] Mak and So, *Scientific Feng Shui for the Built Environment: Theories and Applications*, 149.

the most weight with an average of 5 environmental points for each Feng Shui element whereas street had no environmental points at all. Overall, exterior planning was more important than the interior planning and site was also an important category. But how did this play out in the different types of housing?

The major finding was that it was due to the villas' locations and generous designs in many aspects that allowed villas to adhere to a high number of Feng Shui elements; with an average three more Feng Shui elements than the other types of housing. Hence as expected villas had more environmental points. But was it more effective when it came to the environmental points? Villas actually performed better when it came to environmental implications. As shown in the graphs below Villas had 5.99% more Feng Shui elements but had 8.33% more environmental points than the other types of housing. This was seen to be attributed mostly due to the better orientation villas had. Better site features played a big role as well.

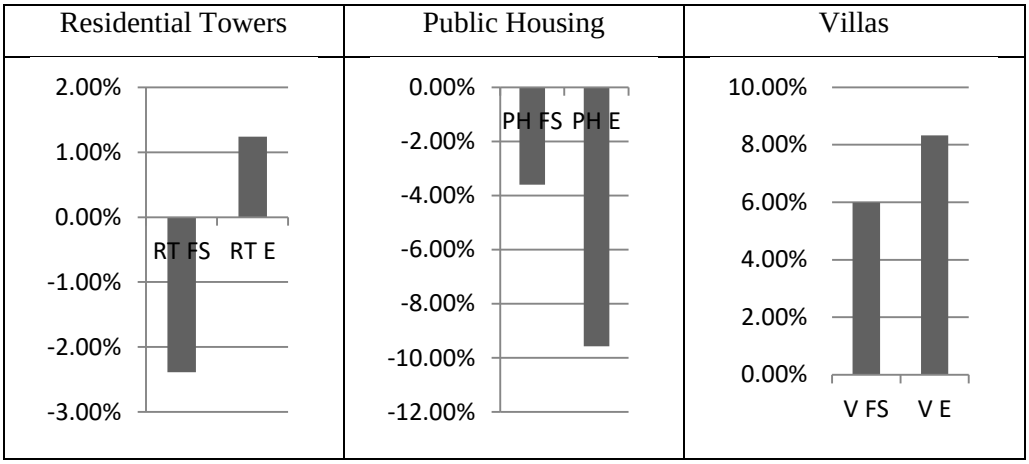


Table 5-1 Feng Shui principles and Environmental points to average in the different types of housing

Zone wise, New Territories had the highest average number of Feng Shui elements followed by Hong Kong island. When it came to efficiency due to the reasons mentioned in the 4.4.3 public housing estates were the most inefficient when it came to the number of environmental points per Feng Shui principle. It had an

efficiency ratio of around 10% lower than the other types of housing. Some of the solutions to the problem in order to make sure that Residential towers and Villas fulfill more Feng Shui principles the expansion of BEAM plus in Hong Kong otherwise as known the Hong Kong LEED can be seen to be crucial. In Hong Kong there are credits given to good site design for example planting on site equivalent to at least 20% of the site area is encouraged by the rating system.

The Hysan place is an example of how LEED influenced its design positively to make it an environmentally friendly building. The regular rectangular mass that is prevalent in the buildings in Hong Kong which is almost the choice for developers for its efficiency was broken up to make space for roof gardens. If BEAM plus is expanded and it's incentives increased than more buildings will be built likewise and hence adhere to more Feng Shui elements and enjoy environmental benefits.

Another problem that was highlighted was public housing's poor site layout planning and poor site features. Criteria D was site which although did not have the most environmental points yet important as it had 11 different Feng Shui principles under it. In category D public housing estates achieved 10% lower in the average number of Feng Shui elements than the other types of housing. The problem was found to be the poor plots of land that have been allocated to them.

The Kai Tak development is an ambitious project undertaken by the government to develop the old airport reclaimed site in to a huge and highly complex development project that will span over 320 hectares. It is the largest available land fronting the highly demanded Victoria harbour. It is planned to accommodate 86,000 people with the construction of 30,000 units. However, this time they planned to give some of this prime land for construction of public housing. Actions like this need to be encouraged for public housing estates to be built on better sites.

The morphological analysis highlighted some interesting areas of the previous study already done and made it clearer why certain types of housing did well or not well in certain areas. The morphological form is determined by the stakeholders in order to achieve certain objectives and it was interesting to see how each type of housing

chose to build different forms. It was found that Type B which was called Identical/similar small scale towers that are separate had on average 1.5 Feng Shui principles more than the other types which all had around in average 30 Feng Shui principles. The worst performing morphological type when it came to the average number of Feng Shui elements was form D which was Identical/similar larger scale towers that are separate. Morphological Form C which was Diverse larger scale towers that are separate had the lowest efficiency ratio and as mentioned before had in average the second lowest number of Feng Shui elements. This is interesting as this may explain as to why Public housing estates achieved such a low efficiency rate. The choice of morphological form by the stakeholders played a large role in determining the number of Feng Shui principles adhered to and the environmental implications that hence followed. Form B which was called Identical/similar small scale towers should be sought for in the stand point of a consumer in Hong Kong.

5.1 Limitations of Study

Although the thesis' aim was to provide data and findings that are accurate, like other studies it has its limitations that should be taken account of. An overview of what is going on in Hong Kong was the primary objective of this study and it also aimed to show what the correlations were and finally sought to provide an overall big picture of the Hong Kong's housing situation.

Limitation Area	Implications
The specifications of to confirm a flat's adherence to a specific Feng Shui principle	The specifications were based on the five scholars and other studies that were compiled together. The criteria may not represent a highly accurate picture of

	what a flat had to have in order to adhere to a specific Feng Shui principle.
The accurate environmental implications of a Feng Shui principle	The environmental implications were established with the help of various sources. The implications are accurate but have not been simulated.
The specifications of evaluating whether a flat can reap the environmental implications	The specifications too were established through a study of various sources.
The point system of indicating the significance of an environmental implication	The point system was established according to personal bias and judgment of which resource had more weighting.

Table 5-2 Limitations Table

5.2 Closing Words

Feng Shui is an influential body of study that is embraced by many not only in Hong Kong, China but also in many other Asian countries as well. It would be foolish to regard it as mere superstition and hence ignore it while designing homes and buildings given how many look in to it prior to purchasing a home. It's environmental implications principle by principle, understanding to how it got them, the specifications that need to be met to reap the implications and the current situation in the different types of housing in Hong Kong have been put forward for the informing of others who can benefit. Understanding Feng Shui and its influence in architecture and hence the daily lives of the people should change how buildings are developed in the future and hence bring a lot of valuable changes to the city.

6. References

Bo, Su. “Traditional Feng Shui Architecture as an Inspiration for the Development of Green Buildings.” *The Education Reform and Research Foundation of Jiangsu University China*, 2013.

Bristow, Robert, Robert Blackie, and Nicole Brown. “PARKS AND THE URBAN HEAT ISLAND: A LONGITUDINAL STUDY IN WESTFIELD, MASSACHUSETTS.” *Proceedings of the 2010 Northeastern Recreation Research Symposium*, 2010.

Brouček, J. “EFFECT OF NOISE ON PERFORMANCE, STRESS, AND BEHAVIOUR OF ANIMALS.” *Research Institute for Animal Production Nitra* 47, no. 2 (2014).

Bruun, Ole. *Feng Shui in China*. Nordic Institute of Asian Studies Press, 2011.

Burns, Scott. “Homeowner’s Guide to Landslides.” Portland State University, 2017.

“Centadata - Home Page.” Accessed June 5, 2017.

CFPA Europe. “European Guideline,” 2013.

Chan, Shihchien. “Green Building Design Related to Feng Shui Issues in Taiwan.” *Journal of Engineering and Architecture* 3, no. 1 (2015).

Chang, Dongkuk, Kyongwon Kim, Joohee Park, and Backyong Kim. “Quantification of Feng-Shui Principles in the Design of Korean Houses.” *ARCHITECTURAL RESEARCH* 16, no. 1 (2014).

Chau, Kwong-Wing, S Wong, Y Yau, and K Yeung. “Determining Optimal Building Height.” *Urban Studies* 44, no. 3 (2007).

Chen, Bi Xia, and Yuei Nakama. “A Summary of Research History on Chinese Feng-Shui and Application of Feng-Shui Principles to Environmental Issues.” 九州森林**研究**, no. 57 (2004).

Cisek, Jan. “How Does Feng Shui Work? The Secret of Feng Shui Is the Power of Intention or Belief or Placebo,” 2017.

“Compass Feng Shui School of Thought.” Accessed April 27, 2017. https://www.thespruce.com/feng-shui-history-the-compass-school-1275251.

Cox, Trevor, and Peter D’Antonio. “Determining Optimum Room Dimensions for Critical Listening Environments: A New Methodology,” 2001.

Development Bureau. “Public Open Space in Private Developments Design and Management Guidelines,” 2017.

“Educational Resources.” Accessed May 16, 2017.

Emmons, Charles. “Hong Kong’s Feng Shui: Popular Magic in a Modern Urban Setting.” *Journal of Popular Culture* 26, no. 1 (1992).

Federal Emergency Management Agency. *Are You Ready?*, 2005.

“Feng Shui.” *Wikipedia,* April 19, 2017.

“Feng Shui Consultation | Fung Shui Master, Consultant in Hong Kong | - SkyFortune Official Website.” Accessed June 24, 2017.

“Feng Shui Elements | Learn To Use The Elements In Your Home.” Accessed May 9, 2017.

“Feng Shui Myths of Hong Kong Landmarks.” Accessed April 27, 2017.

“File:Loess Landscape China.jpg - Wikimedia Commons.” Accessed April 27, 2017.

FRRCC. “Healthy Soils and Air Quality.” 2015.

Ge, Janet, and Michael Mak. “Purchasing Family Homes: Feng Shui versus Sustainability.” *Queensland University of Technology*, 2013.

Hathway, E. “The Interaction of Rivers and Urban Form in Mitigating the Urban Heat Island Effect: A UK Case Study,” 2012.

“Here’s Why Hong Kong Skyscrapers Have Holes - Business Insider.” Accessed April 19, 2017.

“HKHopewellCentre - Hopewell Centre (Hong Kong) - Wikipedia.” Accessed June 23, 2017.

“HKHSBCBuilding - HSBC Building (Hong Kong) - Wikipedia.” Accessed April 27, 2017.

Ho, Clifford. “Relieving a Glaring Problem.” *Solar Today*, 2013.

“Hoi Fu Court | Tower Block.” Accessed June 10, 2017.

Hong Kong Buildings Department. “Code of Practice for Fire Safety in Buildings,” 2011.

Hong Kong Buildings Department. “Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers,” n.d.

“Hong Kong Museum of History - Gallery07.” Accessed April 18, 2017.

Hong Kong Planning Department. “Recommended Minimum Width Standards for Footpath/Walkway,” 2017.

House Plans Helper. “Kitchen Dimensions,” 2017.

“Housing Authority Property Location and Profile | Hong Kong Housing Authority and Housing Department.” Accessed June 10, 2017.

“HSBC Headquarters Building, Hong Kong, Detail of Top Showing Cannons - HSBC Building (Hong Kong) - Wikipedia.” Accessed June 23, 2017.

"Kitchen Dimensions." Accessed May 16, 2017.

Leban, Donna. "Glare Matters." 2017.

"Lecture on Sound and Noise Hong Kong Planning Standards and Guidelines," n.d.

Lee, Tik-chun. "The Last Hakka Farmer : A Case Study of a Disappearing Agricultural Industrial Heritag." University of Hong Kong, 2015.

Ludrup, Jampa. *Feng Shui: Seeing Is Believing*. Wisdom Publications, 2012.

Luk, Chung-Leung. "Consumers' Views of Feng Shui: Antecedents and Behavioral Consequences." *Psychology & Marketing* 29, no. 7 (2012).

Mak, Michael. "Feng Shui Villages in Hong Kong: A Case Study of Tai Fu Tai Mansion." *University of Newcastle*, 2014.

Mak, Michael, and Janet Ge. "A Study of Modern Sustainable Buildings in Sydney from the Feng Shui Perspective," 2016.

Mak, Michael, and Janet Ge. "Sustainable Design and Feng Shui: A Case Study of an Office Building in Sydney." *International Council for Research and Innovation in Building and Construction (CIB)*, 2010.

Mak, Michael, and Thomas Ng. *Feng Shui: A Chinese Approach to Integrated Design*, 2009.

Mak, Michael, and Albert So. *Research in Scientific Feng Shui and the Built Environment*. City University of Hong Kong, 2009.

Mak, Michael, and Albert So. *Scientific Feng Shui for the Built Environment: Theories and Applications*. City University of Hong Kong, 2015.

"Midland Realty - 16Yrs Transaction History." Accessed May 18, 2017.

Mills, James. "Western Responses to Feng Shui." *Middle States Geographer* 32 (1999).

Mir, Ali, and Kheir Al-Kodmany. “Tall Buildings and Urban Habitat of the 21st Century: A Global Perspective.” *Buildings*, 2012.

Moore, Malcolm. “Hong Kong Government Spends Millions on Feng Shui,” 2010.

National Association of Home Builders Research Center. “Designing for Flood Levels above the BFE,” n.d.

Ng, Edward. “Lecture on Sound and Noise Hong Kong Planning Standards and Guidelines.” n.d.

Ng, Edward. “Solar Workshop.” 2014.

NYC Parks. “Tree Planting Standards,” 2014.

Oldershausen, Sasha. “Meet Donald Trump’s Feng Shui Master.” *The Guardian*, 2016.

Overbeke, Chris. “Does It Really Matter If There Is a Tree near a Building?” OMC Associates, 2017.

Peng, Lilliana, and C Jim. “Green-Roof Effects on Neighborhood Microclimate and Human Thermal Sensation.” *Energies*, 2013.

Pitts, Adrian, and Jasmi Saleh. “Transition Spaces and Thermal Comfort - Opportunities for Optimising Energy Use.” *University of Sheffield*, 2006.

Planning Department. “Residential Densities.” Hong Kong Government, 2016.

Poulston, Jill. “Taking Feng Shui Seriously.” Auckland University of Technology and New Zealand Tourism Research Institute, 2009.

Queensland Government. “Smart and Sustainable Homes,” 2017.

Sengpiel. “Decrease in Level of Sound Pressure and Sound Intensity with Distance,” 2017.

South China Morning Post. “Residents Struggle with Glare as Light Pollution Spreads to Tseung Kwan O,” 2009.

Thomas, P. “Effective Natural Ventilation in Modern Apartment Buildings.” *INTERNATIONAL PLEA CONFERENCE*, 2014.

Tsang, Eric. “Toward a Scientific Inquiry into Superstitious Business Decision-Making.” *Organization Studies*, 2004.

US Department of Labor. “National Census of Fatal Occupational Injuries in 2015.” Bureau of labor statistics, 2016.

US Green Building Council. “Green Building Rating System For New Construction & Major Renovations,” 2002.

USEPA. “Healthy Soils and Air Quality.” 2015.

“Using Trees and Shrubs for Privacy and Wind Screening (Home Lawn and Garden).” *Home Lawn and Garden (Penn State Extension)*. Accessed May 16, 2017.

Wing. “The Repulse Bay Overview,” 2015.

Wisconsin Log Homes. “Improve Your Life with Feng Shui,” 2017.

Xu, Jun. “A Framework for Site Analysis With Emphasis on Feng Shui and Contemporary Environmental Design Principles.” Virginia Tech, 2003.

Yamamoto, Yoshika. “Measures to Mitigate Urban Heat Islands.” *Quaterly Review*, 2006.

Yi, Ding, and Yong Hong. *Geomancy and the Selection of Architecture Placement in Ancient China*. Shi Jia Zhuang, Hebei Science and Technology Press, n.d.

Yong, Teh Tien. “FENGSHUI: Its Application in Contemporary Architecture.” *Mimar 27*, 1988.

“香港地方.” Accessed May 5, 2017.

7. Abstract (Korean)

국문초록

다양한 홍콩 주택 유형에서 풍수의 환경적 요인이 미치는 긍정적 효과 연구

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이성적 지식이나 경험에 의거한 자료를 통해 궁극적인 현실을 완전하게 묘사하는 것은 불가능하다. 프리초프 카프라(Fritjof Capra)는 우리가 사는 현실이 무한한 다양성, 포괄성, 그리고 복잡성을 지닌 곳 중 하나로 이해하고 있다고 규정한다. 개념적인 사고를 통해 세상을 완벽하게 이해한다는 것은 사실상 불가능에 가깝다. 그 결과, 풍수와 그 비슷한 이론들은 측정이 가능하거나 정량화가 가능한 다른 이론과 비교될 때 의미가 없는 것으로 여겨져 외면당해왔으며, 심리적 위안을 위해 이용되는 몇몇의 경우를 제외하면 환경적 이점이 없는 것으로 여겨졌다. 풍수는 특정한 환경 그리고 특정한 대지 조건에 놓인 주택에 적용했을 때, 몇몇의 환경적 이점과 불리한 점을 제시할 수 있다. 하지만 그것이 어떻게 작용하는지는 많은 사람들에게 알려지지 않았으며, 대다수의 사람들은 풍수의 원리에 대한 것조차 모호하게만 알고 있을 뿐이다.

풍수는 약 3000 년 동안 존재해왔으며, 중국인에게 중국의 건축환경을 구축함에 있어 기초적인 역할을 담당하였다. 또한 풍수는 어느 곳에 어떻게 주거시설이 구축되어야 하는지에 대한 제언을 하던 고대 지혜의 후신과도 같다. 이러한 지혜는 천문학적 관측과 우리를 둘러싼 자연과 인간 현상

관찰을 통해 형성됐다. 중국인들이 따르고 있는 원칙들은 단순히 행운을 부르기 위한 것이 아니라, 오랜 기간 동안 직관적으로 관측한 결과를 바탕으로 하여 전승된 지혜들로 인식되는 것이다.

본 논문은 풍수의 원리들이 인간의 생존을 위해 발전된 여러 원리들을 반영한 것이라는 가설을 제시한다. 당시는 자연환경에 대한 이해도가 낮았고 그에 따라 미신적인 원리에 의해 세상을 인식하였으므로 좋은 관례는 곧 행운을 부른다는 믿음이 있었다.

주택의 풍수적 조건은 잠재적인 구매자 그리고 그 중에서도 특히, 세계적인 선진 도시로 여겨지는 홍콩의 시민들에게 중요한 요소로 작용한다. 홍콩은 150 년간의 영국 통치로 인하여 여러 면에서 서구화되었음에도 불구하고, 본토 출신의 사람들을 포함한 홍콩의 소비자들은 여전히 풍수 원리들을 중요하게 생각하고 있다. 홍콩을 상징하는 많은 주요 마천루들은, 사람들이 크게 인식하지는 못하지만, 풍수의 원리에 입각하여 설계되었으며 건물의 주요 특징이나 디자인은 풍수 전문가가 결정하였다. 대기업 또한 그들의 사무용 건물을 지을 때, 중국 내에서 풍수가 미치는 영향력을 인식하고, 근로자들의 사기 증진 목적 뿐만 아니라 건물의 가치를 높이기 위한 목적으로 풍수 전문가를 섭외한다.

중국인들 사이에서 풍수는 단순히 '기(氣, 에너지)'를 충분히 얻고, 그들의 삶에 있어 전체적인 행운을 얻기 위한 이론이 아니라, 주변 환경과 조화를 이루며 살아가는 것과 관련된 것이라고 여겨진다. 이런 이유로, 보통의 일반적인 오해와는 다르게 동양과 마찬가지로 서양 역시 풍수의 환경적 이점에 대해 인식하고 있다. 하지만, 많은 사람들은 일부 풍수의 원리가 환경적 이점을 전혀 제공하지 않으며, 사실 어떤 원리는 이익보다는 해를 끼칠 수 있다는 점에 대해 인식하지 못한다. 수많은 소비자들은 사실 환경적 조건의 중요성보다도 주거에 관한 여러 풍수 요소들을 충족하는 데에만 집중하고 있다. 이는 환경적 조건이 주는 이점들은 간과되고, 실익이 없는

풍수의 요소들만 맹목적으로 좇는 현상이 발생할 수 있다는 점에서 문제시된다. 그러므로 각각의 풍수의 원리들이 야기하는 환경적 영향을 이해하는 것은 필수적이라 할 수 있다.

본 연구에서는 홍콩의 3 가지 주요 주거형태 -초고층 아파트, 공공 주택, 빌라-를 중심으로, 홍콩의 주거 컨텍스트에서 풍수가 어떠한 환경적 이점을 제시할 수 있는지를 밝히고자 한다. 이 연구를 통해 주거 형태에 따른 풍수지리의 요소들 중 어떤 것이 가장 최적의 환경적 이점을 제시할 수 있는지가 명확해질 것이고, 독자들이 그 근본적인 이유에 대해 이해할 수 있게 될 것이다. 또한 풍수의 잠재력에 대해 충분히 이해하고, 효율적으로 기능할 수 있도록 하는 것은 필수적이라고 볼 수 있다.

주요어: 풍수, 홍콩의 주택, 중국 미신론의 환경적 영향, 지속 가능한 설계와 풍수의 유사점
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