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Feng Shui: A Chinese Perspective of Sustainability

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Abstract

Feng Shui is a body of ancient Chinese wisdom in knowledge and experience related to the built environment that has been accumulated for more than three thousand years. Feng Shui, in particular the Form School approach become known as an unique science of site planning, of land use and of the management of human and natural resources. The origins of Feng Shui demonstrated relationships between people and natural ecology in ancient China. In western contemporary architecture, these interactions with the natural and man-made environment called sustainability or sustainable development. This concept of sustainability in the western world only dates back three decades ago in dealing with the harmonious relationship between human and nature. This integrative process is similar to the Chinese holistic view and the Feng Shui approach to the built environment. This paper analyses the principles of Feng Shui and practice of Form School in terms of concepts of sustainability. Examples of sustainable developments are used to illustrate the similarities between Feng Shui approach and concepts of sustainability.

Keywords: Feng Shui, Form School, Sustainability, Sustainable Development

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INTRODUCTION

Interactions between humans and environments are a part of an everyday process. In western contemporary architecture, these interactions with the natural and man-made environment called Sustainable Design. Sustainable design is the philosophy of designing the built environment to comply with the principles of economic, social and ecological sustainability (McLennan, 2004). Sustainable design emphasizes on a holistic approach to eliminate negative environmental impact through skillful and sensitive design. The goal of sustainable design is to look at all the systems together and to make sure they work in harmony. This integrative design process is similar to the Chinese holistic view and the Feng Shui approach to the built environment (Humphreys, 1976).

Feng Shui is a body of ancient Chinese knowledge that aims at creating a harmony between environment, buildings and people. It has influenced most traditional building design in China for thousands of years. With a desire to improve the relationship between humanity and the environment, there is an increasing interest for architects and other building professionals to apply the concepts of Feng Shui into building design and the built environment. It is suggested that interpreting Feng Shui knowledge would embrace the western concept of sustainable design. This paper explores the relationships between the concepts of sustainable design and Feng Shui in environmental design using case studies of modern sustainable buildings in Sydney. Firstly, the principles and practices of Feng Shui in environmental design are briefly explained. Then, a set of five Feng Shui concepts in terms of environmental design are identified. Finally, well recognized sustainable designed office buildings in Sydney are used to illustrate the relationships of sustainable design and Feng Shui environmental design concepts.

FENG SHUI AND SUSTAINABILITY CONCEPTS

The concept of sustainable design in the western world only dates back three decades ago in dealing with the harmonious relationship between human and nature. However, Feng Shui, the ancient Chinese knowledge that aims at creating a harmony between heaven, earth and human has influenced most traditional built environmental design in China for thousands of years.

Since the late 1960's, the impact of western civilisation and technology has grown to global proportions, with more western scholars becoming aware of the limitations of modern scientific paradigms that fail to explain the whole realm of natural phenomena and beginning to realize that there are similarities between modern science and eastern philosophy (Capra, 1975).

However, it was not until 1956, when Joseph Needham published his book series "Science and Civilisation in China", that western readers began to appreciate the scientific context in which Feng Shui flourished. Needham tried to identify relevant aspects of western science and its applications to traditional Chinese counterparts. He began to appreciate the value of Feng Shui in ecology and landscape aesthetics. According to Needham (1959, p.361) Feng Shui "embodied ... a marked aesthetic component, which accounts for the great beauty of the siting of so many farms, houses and villages throughout China".

Furthermore, Kevin Lynch, a pioneer of environmental behaviour research, paid great attention to Chinese geomancy. In his book, "The Image of the City", he concluded that Feng Shui has two major features: firstly, it is an open-ended analysis of the environment where new meanings, new poetry, and further developments are always possible; secondly, it leads

to the use and control of outside forms and their influences where it emphasizes that man's foresight and energy rule the universe and can change it (Lynch, 1960).

Anderson and Anderson (1973) recognized that Feng Shui is an aspect of Chinese cultural ecology. For instance, they interpreted village-level siting of Feng Shui configurations with modern planning opinions on site planning, land use and natural resources, especially those of ecology. They noted that Feng Shui is "basically a very practical system whereby a village is situated such that it does not take up farmland or lay itself open to floods and typhoons... based on sound pragmatism" (Anderson and Anderson, 1973, p.45-50). They called Feng Shui "the traditional Chinese science of site planning", containing "an organized body of knowledge, intensely practiced in application, and of specific intent" (Anderson, 1973, pp.127-128).

Freedman (1979) admitted that Feng Shui is based on self-evident propositions and the expertise of scientific men and called it "mystical ecology". He explained that since Chinese see the universe as being alive with forces, any building is an intervention in that universe, composed of the physical environment and men; therefore, every act of construction disturbs a complex balance of forces within a system made up of nature and society.

Nemeth (1993) searched further for cross-cultural understanding through the interpretation of geomancy maps. He recognized that "cosmographic interpretations of geomancy maps can both teach Western peoples and remind East Asians that in the organization of human activities in physical space, principles that engender productive economic, ecological, and ethical relationships may be governed by a natural law" (Nemeth, 1993, p.94).

In addition, Bruun (1995) conceived that Feng Shui is a system of statements on the man-nature relationship in an environment of holistic thought. He explained that according to Feng Shui, man and landscape are linked together in a system of "immanent order". Nature consists of balanced forces, reacting to any interference imposed on it, and this reaction immediately resounds in man. Moreover, as in any large organism, everything is interdependent and pulsating with energy, penetrating and embracing every single part.

FENG SHUI FUNDAMENTAL CONCEPTS

The principles and practices of Feng Shui are aimed at creating a harmonised built environment for people to live in, and it represents a traditional Chinese architectural theory for selecting favourable sites, as well as a theory for designing cities and buildings (Lee, 1986). There are two main schools of thought and practice in Feng Shui: the Compass School and the Form School. The Form School approach has been well recognized and widely accepted by Feng Shui researchers as comprising the scientific bases in the analysis of built environment (He, 1990; Cheng and Kong, 1993). The Form School established a holistic approach that allows integrated components and elements to be considered for the built environment (Mak and Ng, 2008). The five fundamental concepts of Feng Shui in terms of environmental design are summarized as below.

(1) Unity between Heaven and Human

This is the fundamental principle of Feng Shui, means the harmony between the universe, earth and human energy. Energy is valued in both the physical and the invisible forms known as "*Qi*" (natural energy or breath of life) in traditional Chinese Feng Shui culture. Feng Shui designs are aimed at a balanced and harmonious environment that can produce an ample amount of good *Qi* and filter out the bad *Qi* (Skinner, 1982).

(2) The Five Elements Cycles

Ancient Chinese believed that in the universe, including heaven, earth and human beings, everything has an attribute according to the five fundamental groups of substances. These five elements are fire, water, metal, wood and earth. The characteristics of each of these five elements and their mutual relationships are based on observed natural phenomena, and their relationships are identified as productive and destructive cycles as shown in Figure 1.

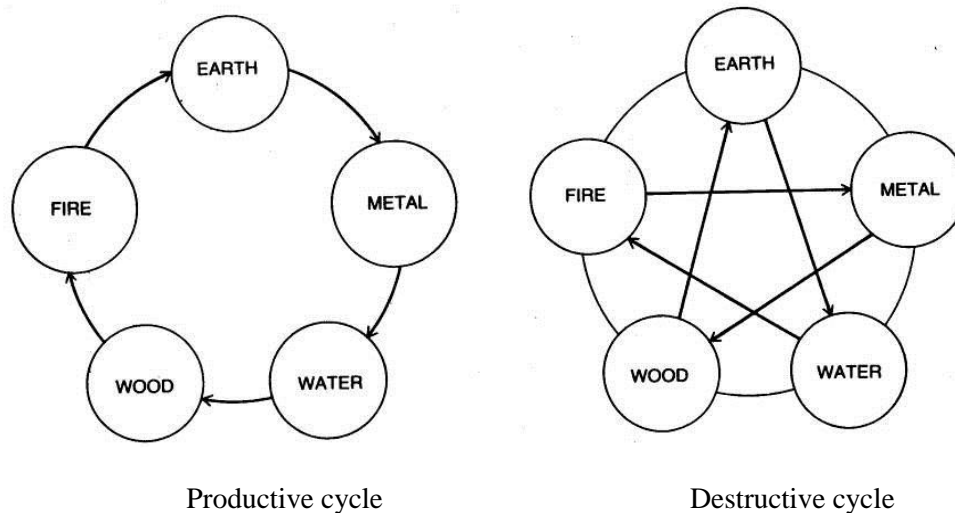


Figure 1: Productive and Destructive cycles of the Five Elements (Walters, 1989)

(3) Yin and Yang Harmony

The ancient Chinese believed that in everything there are two opposing parts: Yin and Yang. Yin represents the passive principles in nature exhibited as darkness, cold and wetness. On a human level, Yin symbolizes femininity and the passive and also represents the realm of the dead. Yang represents the active principles in nature exhibited by light, heat and dryness. On the human level, Yang symbolizes masculinity and the active, and also represents the realm of the living. Yin and Yang are about balance and harmony within a space designed to create balance in the users' life when engaging in the space (Feuchtwang, 1974).

(4) The Form School Model

The Form School is primarily based on the verification of the physical configuration of mountains and watercourses surrounding sites and buildings. The factors comprising the basics of the Form School approach were known as the "Five Geographical Secrets", namely, dragon, sand, water, cave and direction (Lip, 1979). Contemporarily, the Form school approach has been recognized as having a scientific basis in the analysis of the built environment (He, 1990; Wang, 1992; Cheng and Kong, 1993; Mak and Ng, 2005; Mak and Ng, 2008). The combination of these five Feng Shui geographical factors and the four emblems (the green dragon, white tiger, black tortoise and red bird) symbolising the four cardinal directions produce a classic Feng Shui model. This model has been interpreted in diagrams of spatial organization of auspicious mountains and watercourses in most of the classic Feng Shui literature (Shang, 1992; Cheng and Kong, 1993; Han, 1995; Yi et al., 1996; He, 1998). A simplified model was established by Mak (2009) to illustrate the relationships between the key factors of the five Feng Shui geographical secrets under consideration and how dragon veins, the four emblems as revealed in sand, water feature, cave and "Ming Tong" (bright court), and their respective directions were integrated (Figure 2).

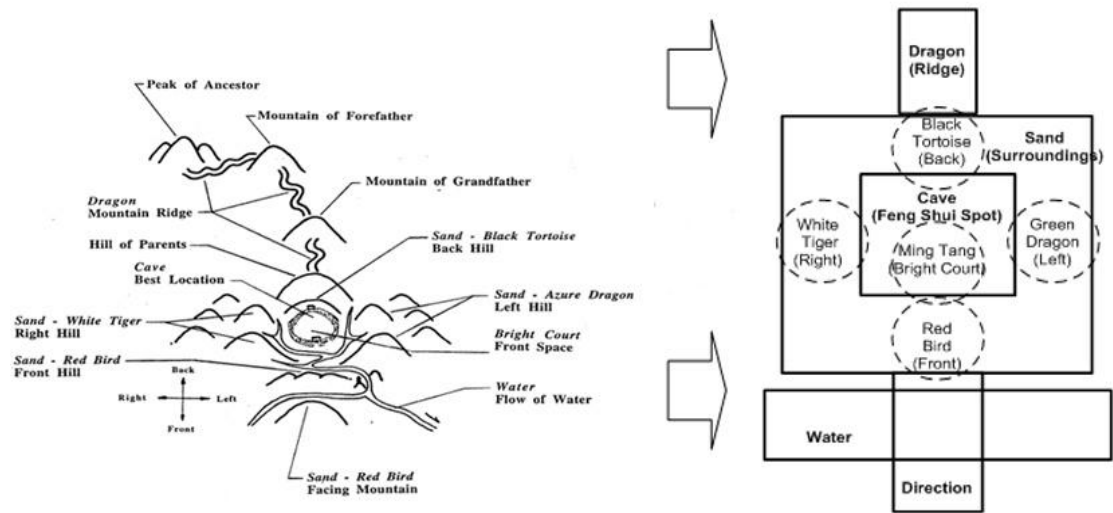


Figure 2: Simplified Feng Shui Model (Yi et al., 1996 and Mak, 2009)

(5) Balance between Interior and Exterior Spaces

When describing the site conditions and the design of buildings, most of the ancient Feng Shui texts, such as *Yang Zhai Shi Shu* (Ten Books on Dwellings for the Living) categorized space into “Outer Form” (exterior) and “Inner Form” (interior). According to Lee (1986), the Outer Form can be identified as the location of the site, conditions that surround the site, the topographical conditions of the site and its shape. The Inner Form can be identified as the layout of the building, the elevations of the building, and elements of building. The concept of a Feng Shui model not only applied to landscape and site selection, but it can also be applied to the internal layout of buildings. Therefore, whether it is dealing with the physical or topographical aspects, or housing structure, or the proportional relationships of the interior of a building, the same principles and relationships of the Feng Shui model are still applied. Feng Shui scholars, Cheng and Kong (1993) provided a further classification of space into four design modules: the surrounding environment, external layout, internal layout and interior arrangement as shown in Figure 3.

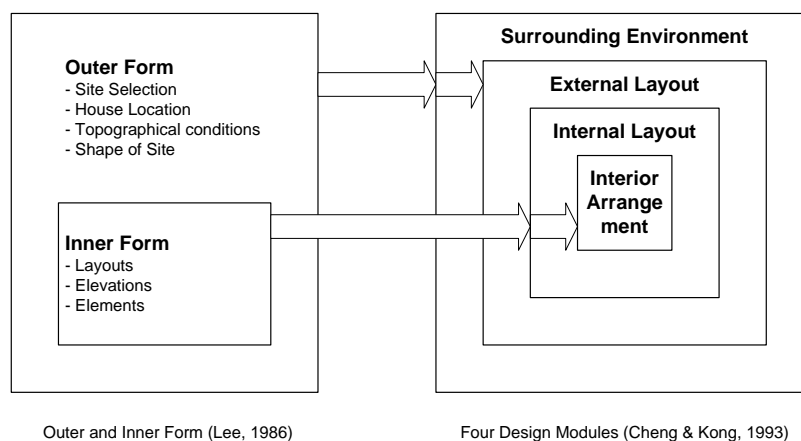


Figure 3: Four Design Modules (Mak, 2009)

CASE STUDY

A Sustainable Low-Rise Campus-Style Office Space in Sydney

The landmark *Commonwealth Bank Place (CBA Place)* is a cutting edge technology and sustainable designed office building in Sydney's Darling Quarter precinct. The building is designed by architects FJMT and a joint venture development between Lend Lease Corporation and the Sydney Harbour Foreshore Authority (SHFA). The Commonwealth Bank is leasing the building on a 13 year term. The *CBA Place* sets global benchmarks in environmental innovation and represents combinations of social, economic and environmental sustainability (Lend Lease, 2012). Adjoining *CBA Place* is a family and leisure precinct with extensive public amenities, which includes a vibrant retail food area with a range of dining options. There is world-class family playground covering more than 4,000 square meters, a large community green, a youth theatre and a 600 bays public car park. The new \$500 million-plus work space is located at Darling Harbour in Sydney's western CBD fringe as indicated in Figure 4.

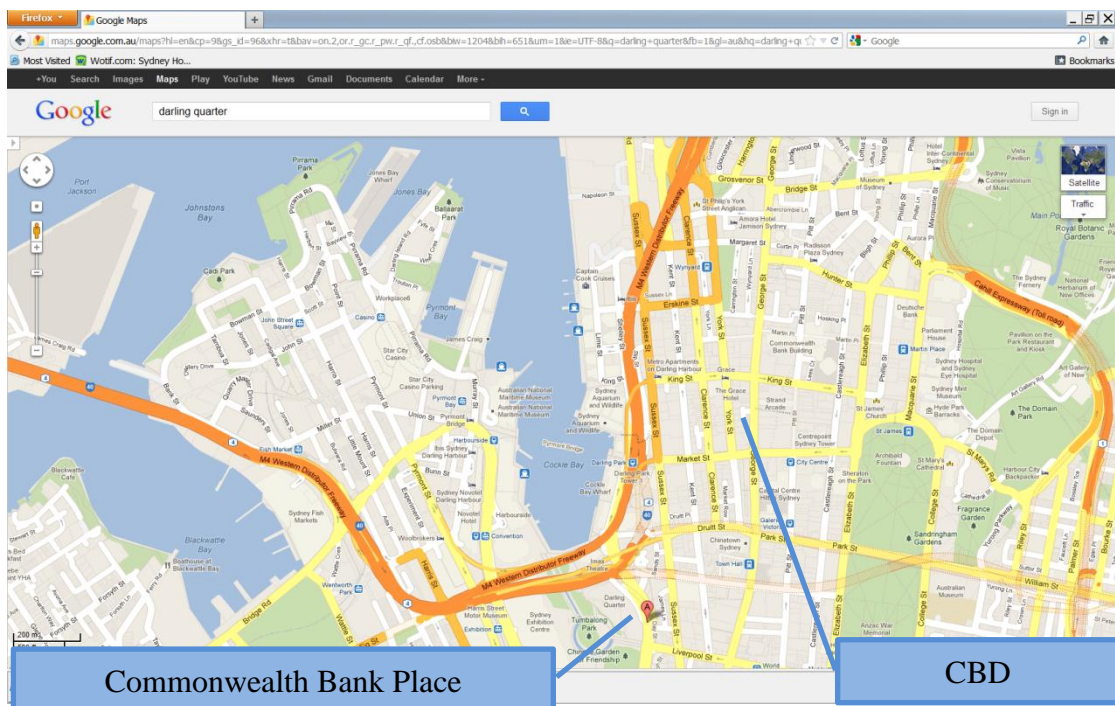


Figure 4: Location of *Commonwealth Bank Place* (Source: Google Map)

The site comprises two (North and South) eight-storey buildings (Figure 5) that more than 6,200 employees across 56,000 square metres of flexible working space (Batten, 2011). The distinct feature of the interior office design in the buildings is open plan campus-style offices with bright colours and textures. The design is embedded with new technologies and sustainability principles into the fabric of the buildings. An open central atrium zone provides a sense of working space with large floor areas. According to Chandler (2011), these are 'office free' with no permanent desks allocated to employees onsite as only 80 per cent of the required number of desks are provided. The employees can freely wander around, chat or meet at the café or meeting rooms provided in the breakout workspaces. A clean desk policy ensures that every desk is cleared at the start and end of the day and personal lockers are provided for all employees to store their equipment (laptops, phone headsets, and personal belongings). This new style of working environment is called 'activity-based working' (ABW) which provides innovative, sustainable and creative work space (Batten, 2011). The benefits of the ABW setting have been identified by Craig (2011) - the CBA chief financial officer - as follows:

- Fulfilling a spectrum of work styles and improve productivity;
- Meeting demands of different activities each day;
- Accommodating varying levels of concentration or collaboration and team activities;
- Increasing visibility and accountability for staff;
- Enhancing the use of flexibility and cutting edge technology;
- Promoting transparency, accessibility and efficiency working environment; and
- Cost effective, less damaging to the environment and sustainable.

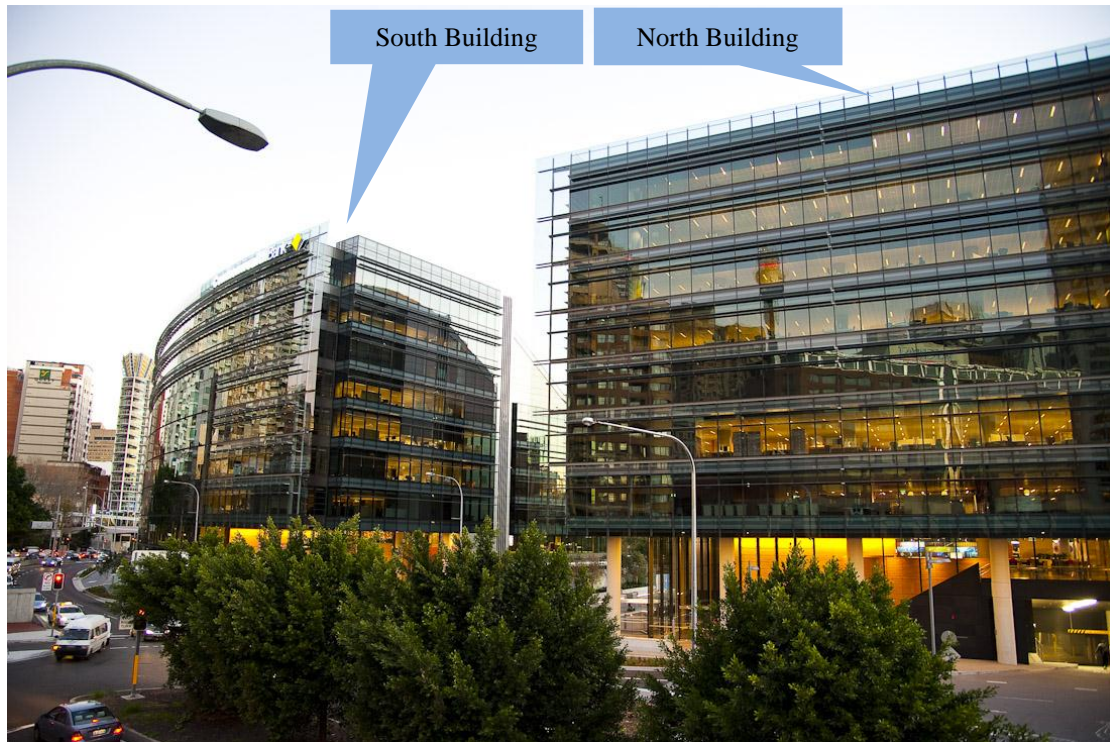


Figure 5: the *CBA Place*, Exterior South and North Buildings (Photo: NTRANCED, 2011)

Figure 6 displays the look up atrium of the North Building. The work spaces are located in the eastern and western aspects that provide ‘home zone’ of 70-100 people where their team is based (Chandler, 2011). However, employees can choose to work in other areas throughout the building. The lifts and facilities are conveniently located in the northern and southern side of the buildings which provide good access for operation and maintenance services. Curtain walls around the buildings and the open central atrium system allow bright natural light to reach the centre zone of each floor inside the building. Lend lease (2012) announced a significant number of sustainable outcomes have been created for the *CBA Place* including:

- a six-star Green Star rating for the base building’s office design, with a five-star Green Start rating for office interiors;
- a five star National Australian Built Environment Rating System (NABERS) Energy rating for energy use, i.e., carbon emission reduction through energy efficient design. Both buildings use the central atrium to maximize of natural light and optimize indoor environment quality through the use of chilled beam air-conditioning throughout and single pass fresh air systems that cut energy use by 50 per cent;
- a Tri-generation power plant converts waste energy into power and the building boasts a water treatment facility and extensive recycled materials throughout;
- portable water reduction of 90 per cent through rainwater collecting and onsite water recycling initiatives;

- a community garden located on the rooftop of both buildings for employees to grow herbs and vegetables for use by internal catering service and café;
- a high performance façade which allow tenants to install open and fresh air conservatories in various locations, and use of sun shading devices to reduce heat load on the building;
- maximizing mobility, connectivity and efficiency, by equipping people with the latest technology, including laptops with a built-in webcams for video calls, a unified communication system, Follow-You printing system, LCD collaboration screens and smart boards and a secure wireless network can be accessed anywhere in the building. As suggested by Daly (1990), the role of sustainable development in a contemporary world focuses productivity using technologies.

The National Australian Built Environment Rating System (NABERS) measures an existing building's environmental performance during operation. NABERS rates a building on the basis of its measured operational impacts in categories such as energy, water, waste and indoor environment (NABERS, 2012).

Green Star is a national environmental rating system established by The Green Building Council of Australia (GBCA) for office buildings. The tool rates a building in relation to its management, the health and wellbeing of its occupants, accessibility to public transport, water use, energy consumption, the embodied energy of its materials, land use and pollution (GBCA, 2009). Green Star rating tools use Stars to rate performance, where 4 Star Green Star Certified Rating signifies 'Best Practice'; 5 Star Green Star Certified Rating signifies 'Australian Excellence' and 6 Star Green Star Certified Rating signifies 'World Leadership'.

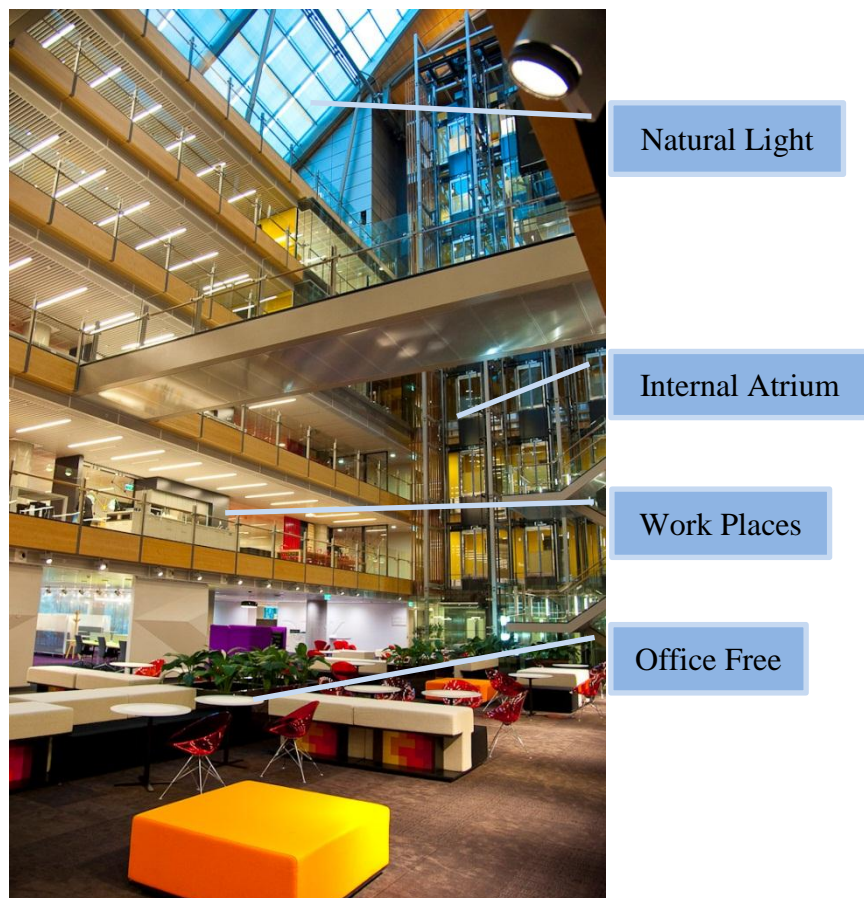


Figure 6: Atrium, North Building (Photo: NTRANCED, 2011)

As a result, the *CBA Place* has been awarded as one of the six-star Green Star – Office As Built v3 rating by the Green Building Council of Australia (GBCA) office buildings in the New South Wales Australia. The outcomes push the boundaries of sustainable development and set global benchmarks in environmental innovations (Lend Lease, 2012).

Analysis

The *CBA Place* delivers a healthy and highly productive and comfortable work environment for all its employees. The activity-based working environment (ABW) empowers the economic outputs produced by employees as results of high engagement and productivity, and thus has flowed on benefits their customers. The harmony office design meets the concept of contemporary sustainability that interconnected human, economy and environment. Giddings, *et al.* (2002) illustrated their relationships that the economy depends on society and the environment, whereas human existence and society are dependent on, and within the environment. With all the sustainable design features, *CBA* employees are led to a sustainable way of living into a sustainable work environment (Batten, 2011). Staffs carry only laptop to work that reduces paper usage significantly. Data will be captured from screen throughout the North and South buildings, is an example.

In accordance with the Feng Shui concepts, the provision of an open central atrium is a prime feature of *CBA Place*. The analyses of the features of the *CBA Place* according to the five Feng Shui concepts are tabulated in Table 1.

Table 1: Analysis of the Features in Case Study according to Feng Shui Concepts

Feng Shui concepts	Features in the Case Study
(1) Unity between heaven and humanity	<ul style="list-style-type: none"> • Use of an open central atrium to bring the natural environment inside the building. There are some green plants on the top floor and ground floor, however, natural features, such as water features are not provided in the building.
(2) The five Elements cycles	<ul style="list-style-type: none"> • Use of an open central atrium, lifts and staircases to provide communication and circulation pattern; however, the five elements and their features are not provided.
(3) Yin and Yang harmony	<ul style="list-style-type: none"> • Use of an open central atrium for the full height to provide a balance between natural and built environment, and sense of space.
(4) Form School model	<ul style="list-style-type: none"> • The building is located at Darling Harbour in Sydney’s western CBD fringe; southern of the Cockle Bay, Pyrmont Bridge Road and M4 Western Distributor Freeway; adjacent to the North-eastern end of Tumbalong Park and North of the Chinese Garden of Friendship. • Use of a glass curtain wall system to provide maximized views of surrounding areas to the East and the Tumbalong Park to the south-west. • Lifts and facilities are designed at the northern side of the north building that blocks the nearby traffic noises from the adjacent flyover road structure. • Large open space provided in front of the entrance of the building.
(5) Balance between Interior and Exterior spaces	<ul style="list-style-type: none"> • Roof garden on the top level is connecting to the open central atrium, so providing a balance between the interior and exterior space. • Operable facades which allow tenants to install open and fresh air conservatories in various locations • Connecting interior spaces to the exterior (Figure 7) through natural light from windows and central atrium, with maximized external views to Sydney CBD and the Turmbalong Park view.



External facade of Darling Quarter

Internal Opening Atrium facing at roof level

Figure 7: Interior and Exterior Spaces (Source: photos taken by authors)

Courtyard Houses and Modern Sustainable Buildings

As shown in the analysis, the provision of an open central atrium is a key feature of *CBA Place* that satisfy the five Feng Shui concepts. This open central atrium design is similar to traditional courtyard houses in Beijing (Figure 8) that, under the Feng Shui principles, provided the balance between natural and built environment, Yin and Yang harmony and the sense of unity between heaven and human (Xu, 1998).

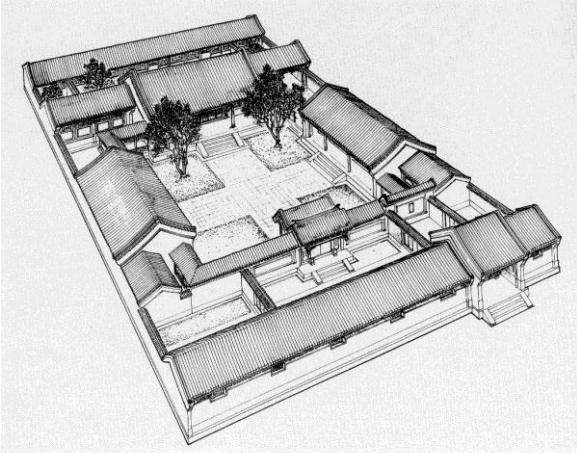


Figure 8: Beijing Courtyard House (Source: Sohu, 2012)

This traditional courtyard design, or in modern term, open central atrium is actually the essential element of the sustainable design of modern buildings. More examples of integrating the central atrium in modern sustainable buildings are *Workspace6* in Darling Harbour, Sydney and *No. 1 Blich Street Office Building*, CBD Sydney.

Workspace6

An office building, *Workplace6* in Sydney is another example of the highest standard in sustainable design in New South Wales (NSW). The site is located at a fringe area of Pymont, opposite the Star City Casino on the waterfront at Darling Island, and South East corner of the Darling Island peninsula. Accenture and Google have leased 96 per cent of the office space for 12 and 10 year terms respectively, while Doltone House has signed a 15 year lease for the 1,800 square meters retail space on level 1 (Sustainable Property News and Forum, 2009).

The *Workspace6* provides approximately 18,200 square meters of space over six storeys and offers some of the largest commercial floor plates in Sydney, with over 3600 square meter as shown in Figure 9. The main building features include:

- 16,200 square meters of office space over five levels, and 1,800 square meters of ground floor retail space;
- large floor plates, with a typical floor area of 3,620 square meters;
- open central atrium zone providing a sense of space in the lift lobby;
- core zone, allowing light to reach the centre zone of each floor;
- no point on the large floor plate is more than 12 metres from an external window or the atrium;
- parking for 135 cars and provision for 120 bike racks.

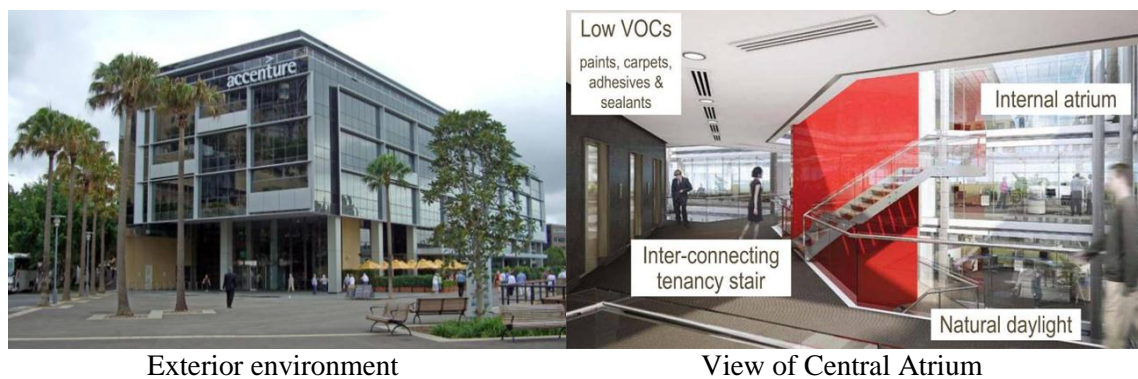


Figure 9: Workspace6 Exterior and Interior Views (Source: Spears, 2009)

Workplace6 is a prime grade office building achieving world leading standards in environmental design and resource efficiency. According to the nine categories of the Green Star rating scheme, it has been awarded a total score of 83 points (Spear, 2009). It is the first commercial development to achieve a 6-star Green Star rating for design in NSW, and is targeted to receive a 5-star NABERS energy and water rating, the highest ranking available in all ratings and classed as “world leading”. It is designed to reduce greenhouse emissions by 70% and to cut drinking water consumption by almost 90%, compared with an average existing office building (GPT, 2009). Key environmental initiatives include:

- a gas-fired generator to generate power for the building onsite, reducing the peak load by 25 per cent; the waste heat from the generator is then used to run an absorption chilled that will cool the building;
- use 25 per cent Green Power drawn from wind and solar sources;
- a black water recycling system that will treat sewage on-site. Potable water yielded from black water recycling will be used for toilet flushing, with excess water offered to the local community for irrigation of the adjacent parks and gardens;
- rejection of waste heat from the building to the adjacent harbour, in lieu of the use of cooling towers; this will have the effect of significantly reducing the water consumption of the building, as well as eliminating the risk of legionnaires disease;
- roof mounted solar panels to heat the building’s hot water supply;
- the use of recycled materials, sustainable timber and minimal use of polyvinyl chloride (PVC) and volatile organic compounds (VOCs);
- maximisation of natural light with central atrium and optimize indoor environment quality through the use of chilled beam technology;
- operable facades which allow tenants to install open and fresh air conservatories in various locations;
- maximisation of window openings overlooking Sydney city and harbour;
- high technology facade and sun shading devices to reduce heat load on the building.

With all the sustainable design features, *Workplace6* has achieved massive saving in energy and water consumption. As a result, the greenhouse gas emission of *Workplace6* is 39 KgCO₂ per square meters, compared with an average standard building is 87 KgCO₂ per square meters. In addition, the water consumption is 2.1 million litres per annum compared with an average standard building's consumption of is 31.1 million litres per annum (Spears, 2009).

No. 1 Bligh Street, Sydney

This is a modern style office building located in the Sydney CBD district overlooking Circular Quay and the Sydney Harbour Bridge. It is an ecologically sustainable development and was awarded 6-star green status by the Green Building council of Australia. Green features include a basement sewage plant that recycles 90 percent of the building waste water, solar panels on the roof and air conditioning by chilled beams.

It is Australia's first major high-rise building with a full double-skin façade with external louvers. These conserve energy, eliminate sky glare provides optimal user comfort. The angle of the louvers blades is automatically adjusted depending on their orientation to the sun. A naturally ventilated, full height atrium located on the southern side of the building, maximizes natural light to each office level.



Figure 10: Full Height Atrium at No. 1 Bligh Street, Sydney (Source: Vivian, 2012)

CONCLUSIONS

The sustainable design concepts aimed at the creation of enjoyable space for human interactions and balance between the natural and the built environment. It can be identified with the Feng Shui concepts of unity of heaven and humanity, and the Yin and Yang harmony.

For the sustainable design considerations, the concepts of energy efficiency that focus on the sources and consumptions of natural resources are translated into measurement of physical attributes, such as, light, thermal, water, air quality, etc. It focused on how the man-made environment affects people and their performances. In contrast, the Feng Shui concepts of the Form School model and balance between interior and exterior spaces are emphasized on the balance of physical forms and spatial arrangement. It also focuses on the balance, harmony and experience of the environment.

In the case study of modern sustainable buildings, the provision of the open central atrium is a prime feature to satisfy these criteria from both sustainable design and Feng Shui considerations, which is similar to the traditional application of Feng Shui practice to the courtyard houses in China.

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