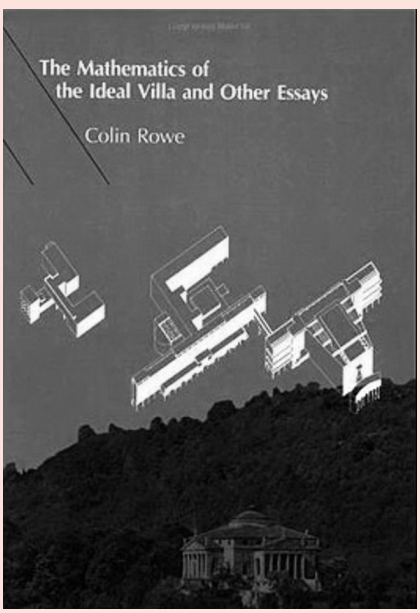
Book Review:
The Mathematics of the Ideal Villa and Other Essays

Rowe, C. (1982).
Cambridge, Massachusetts: The MIT Press.
233 pp.



Systematic Analysis of Unique Innovation to Create New Knowledge

Most of the key points used to define "Architecture" are related to the art or science of building and habitable structural design. In extended meanings, moreover, architecture can also be referred to the organisation to form the coherent assembly of other creations like gardens, novels as well as computer systems. To fulfil users' physical, spatial and aesthetic needs, it has to go through systematic development process such as the widely regarded eight-step Plan of Work (Royal Institute of British Architects (RIBA), 2013). It is started from Strategic Definition at Stage 0 where business cases or the assessments of current situation, the upcoming benefits as well as the capability of the organisation to perform the task are conducted to make a decision on the future of a project development to the preparation of project objectives, outcomes as well as budget based on the reviews of physical parameters and constraints of site at Stage 1: Preparation and Brief. Then the final project brief is prepared to include the outline proposals for building programme, structural and building service design and specifications as well as the preliminary costs at Stage 2: Concept

* Corresponding author.
E-mail: archan@ap.tu.ac.th
Received 20/3/2018
Revised 10/4/2018
Accepted 218/2018

Design. The continuously developing of such information at Stage 3: Developed Design and Stage 4: Technical Design can be used for the planning of construction programme at Stage 5: Construction. The completion of both onsite and offsite activities leads to the handover of building and the conclusion of building contract at Stage 6: Handover and Close Out and Stage 7: In Use.

However, the uniqueness of each architectural project has also generally been recognised due to the physical contexts of site specific development influenced by social and economic conditions at the time. Therefore, at any particular stage of systematic development processes, new knowledge would have to be created through a cyclical four-step Wheel of Learning (Handy, 1991). It is initiated from either positive or negative questions that deserve to be further explored. In architectural design, it can be inspired by distinctive cases or projects. Then relevant theories that can be applied to find potential solutions have to be proposed and tested, using the collective social interaction/participation. Eventually, new knowledge can be learned and captured while existing knowledge can be simultaneously renewed at the reflection stage. Nowadays, approaches to find innovative solutions under the limited available technical resources within the practical constraints of business can be effectively based on the concept of Design Thinking (Brown, 2009).

Unique innovation in architectural design can be seen particularly in context that needs answers for specific problems. For example, Horayangkura (2017) series of extensive research is a great attempt to find the identity of modern Thai architecture. From Siamese westernization at the reign of King Rama IV (1851-1868) to the present, Thai architecture has been significantly influenced by western architectural styles and construction techniques to meet new types of functional requirements. Therefore, the lack of continuous development in styles and techniques of traditional architecture has been a critical obstacle to the development of Thai values/identity in contemporary architecture. A systematic research process has revealed five key aspects as guidelines to create Thai contemporary architecture. Firstly, it is the six abstract core values of Thainess influenced strongly by tropical climate and the availability of materials and construction technology. They are 1) the lightness floating quality of structure 2) the excellent quality and quantity of ventilation 3) the existence of central courtyard 4) the cool atmosphere 5) the perfect blend of light and shadow and 6) calm and peaceful atmosphere. Secondly, such core values can be clearly represented by vernacular characteristics including 1) space and forms that coordinates with nature 2) landscape design that suits tropical needs 3) light, properly ventilated structure with distinctive high pitched roof that creates appropriate stretch of hanging come together to serve 4) the contemporary needs. Thirdly, distinctive aesthetic representation of Thai contemporary architecture has to be recognised as graceful and refine. The integration of simplified details and iconic elements through planning arrangement is usually full of hidden meanings originated from traditional beliefs to be interpreted as symbolism and Thais way of life or the fourth and the fifth key aspects.

New knowledge initiated from the analysis of unique innovation in architectural design was also the heart the book “The Mathematics of the Ideal Villa and Other Essays” by Colin Rowe. As an architect and a distinguished member of Texas Rangers movement at the University of Texas, Austin in the 1950s, Rowe’s compilation of essays offers a comprehensive analysis of modern architecture design and development in various aspects. From the first Chapter, the comparative studies between the classic 16th century Renaissance architecture represented by Palladio’s Villa Capra Rotunda and the masterpiece of 20th century Modern architecture represented by Le Corbusier’s Villa Savoye revealed the similarities in terms of design philosophy. The needs for an ideal good old Roman lifestyle were the major reasons especially in Palladio’s case. Moreover, design aesthetic in both cases was achieved by traditional and contemporary relationship between building elements and the natural setting. The second comparison of cases, between Palladio’s Villa Foscari and Le Corbusier’s Stein House at Garches, focused on the focal point of single-volume buildings. Building width, length and height ratios related to human’s proportion and musical compositions were thoroughly explored. It was founded that the planned ambiguity and the minimal reference to historical elements of Le Corbusier’s works became a sign of progress in spatial design that had been serving individual taste since the 18th century. Besides, some other crucial aspects such as the effects of structural system, building enclosure and roof on the arrangement of building plan and space were also mentioned. At the end of the day, Rowe suggested that buildings designed by Palladio and Le Corbusier were based on two principles: the use of geometry as the mean to manage relationship among elements and all design must serve specific purposes of its own context.

In Chapter 2: Mannerism and Modern Architecture, Rowe once again explored the relationship between particular periods of artistic style and architectural design. This time the discussion was about the influences of Mannerism from the 16th century on the development of the 20th century Modern architecture. The selected case was the unique Villa Schwob (1916) designed by Le Corbusier at the early stage of his professional life. Like neoclassic buildings of the renaissance period such as Palladio's and Zuccheri's, the Villa was design with symmetrical plan. However, the use of modern skeleton concrete structural system made the building lighter than the predecessors. The more subdued design with minimal decoration, on the contrary, helped to heighten emotion and moral aspects of the 20th century. These distinctive treatments inspired by the philosophy of Mannerism still made Villa Schwob comparable to the unique designs with classical composition of elements from the late 16th century High Renaissance that are full of complexity and desire to change spirit inside the façade.

Since Mannerism tends to include human aspiration to achieve the higher level of success as well as the skepticism to the success of works created around religion and politics at the early Renaissance period, Modern architecture had also been developing in such a direction. Moreover, the attempts to create highly visible form as a composition of three dimensional elements in Modern architecture had been supporting by new innovations in materials and technologies from the industry. The new aesthetic freedom from any kind of structural or cultural limitations to express the elusive abstract ideas and emotions of a person in geometric forms influenced by Cubism and mathematics can be seen extensively in Le Corbusier's writings and design works, Bauhaus building, designed by Walter Gropius in 1926. To strengthen the point of similarities between Mannerism and Modern architecture origins and executions, there are a number of comparisons including building plans, elevations and textures of works designed around the 16th and the 20th century throughout the chapter.

Chapter 3: Character and Composition; or Some Vicissitudes of Architectural Vocabulary in the Nineteenth Century focused on the development of character and composition that created a new vocabulary of Modern architecture. Generally, Modern architects design manifesto, even the ones belong to the masters like Le Corbusier and Mies van de Rohe that might be seen as an implication to building characters, may not directly relevant to architectural design at all. Unlike the 18th century architecture that character and composition were artistically intertwined due to the aspiration to achieve the picturesque quality as well as the diversity in design. At one point, such a character was created freely from any sources of inspiration. It can be from the past like Jeffry Wyatt's neoclassical style at Wooley Park, Berkshire (1799) or Elizabethan style at Endsleigh in Devonshire (1810). At around mid to the late 19th century to the 20th century, the focus of Modern architecture was gradually shifted towards the mix of character represented by forms with functions. Form was perceived as the composition of elements to provide functional solutions within the building structure in general non-specific/international context. Therefore, a successful Modern architecture has to follow the widely referred "Form Follows Function" design approach. It would definitely be different from the pure character that aims to achieve the picturesque composition like Gothic revival architecture or pre-Raphaelite art of the High Victorian period.

The main focus of Chapter 4: Chicago Frame was the extensive use of steel in reinforced concrete skeleton structure in Chicago commercial development. This unique character of the late 19th century (1880-1890) architecture was comparable to the use of column orders in antiquity and renaissance architecture. As the site of the 1893 World Exhibition commemorating 400th anniversary of Christopher Columbus discovery of the New World, physical transformation of Chicago definitely created the additional value. With the supportive economic condition, it made the city of Chicago the prime case that readily adopted the steel skeleton structural system to create space for office buildings as seen in The Loop business districts. Almost at the same time, the notable architect Frank Lloyd Wright had been separately developing architectural design approach for houses based on the composition of planes influenced by the idea of Cubism.

It was not until 1924 that Wright proposed a different interpretative approach from the business oriented "Chicago School" way to conceive large commercial buildings using the skeleton system. In National Life Insurance Company building, instead of a monolithic design, Wright created a unique character by putting all transparent elements together with cantilevered structure based on the carefully designed planning to form a unity of dynamic spatial composition. Further extensive arguments based on distinctive architecture in different contexts like Reliance Building (1894) by Daniel Burnham in Chicago and the ideal Glass Tower project

(1921) by Mies van de Rohe in Berlin as well as high rise buildings in Ville Radieuse project (1930) by Le Corbusier also emphasized the differences between character and perception of architects who created purely functional buildings and those who focus more on the added value including idealism, symbolism, aesthetics and social moralistic criticism. At the end of the day, it was a well-balance of both functional requirements and the added value that became the crucial factor of the International Style achievement.

Chapter 5: Neo-'Classicism' and Modern Architecture I focused on the influences of the 18th century Neo-Classicism represented by Palladio's works in Europe on the 20th century Modern Architecture by great American architects including Mies van de Rohe. Unlike the creations with picturesque quality, general characteristics of the 20th century Modern or Neo-Palladian design like Resor House (1939) project by Mies van de Rohe was the emphasis on internal and external symmetry. "Parti" or the fundamental preferences can be mostly seen in graceful small single volume buildings with definite functions. However, this historical development seems to be at odd with general expectation that external appearance is the main focuses of Modern architecture. In-depth analysis reveals that post-Mies project developments including Minoru Yamazaki's St. Louis Airport (1955) and Eero Saarinen's Kresge Auditorium and Chapel (1953) were challenging to the norms. Even though the two International Style buildings appeared to be very modern, they were designed under the classical Orthodoxy theory. Rather elusive and eclectic in nature, the Orthodoxy theory was not only about how to objectively put appropriate design elements together to generate building space without overemphasizing on the creation of form. The theory also included the influential social aspects and spirit of the age as symbolism to solve both functional problems and to celebrate human capabilities. Now, asymmetry created from peripheral compositions beyond the boundaries can also be used in various different ways to generate a new type of balance as seen in almost all buildings designed around the same period like Gropius'' Bauhaus and Le Corbusier's House at Garches.

Chapter 6: Neo-'Classicism' and Modern Architecture II confirmed that further development based on the idealistic principle of classical order under the skeleton structure can provide a good balance of spirit and form to serve practical needs of space in Modern architecture. Comparison between the historic Villa Rotonda (1550) by Palladio and a single block Modern architecture with obscured centralized space like Crown Hall (1956) at Illinois Institute of Technology (IIT) by Mies van de Rohe revealed the similarities of mathematical-based order inspired by Louis Sullivan. The same centralized concept can also be seen in contemporary architecture and later buildings like Kresge Auditorium (1953) at Massachusetts Institute of Technology (MIT) by Eero Saarinen and Goodyear House (1956) at Fairfield County, Connecticut by John Johansen. Moreover, such new interpretations of compositional principles that created International Style architecture can also be seen in Mies van de Rohe as well as Le Corbusier earlier designs of 1920s-1940s. Building weight transferred from flat roof, floor plates through beams and columns while the freely placed walls eventually come together to create distinctive horizontal space appeared for the first time in Mies van de Rohe's Library of Administration building (1944) also at IIT. With the new structural approach, however, the concept of neo-classic centralized space was understandably now harder or even impossible to be created due to the obstructions from building elements. The best case of the new International Style architecture with the internal unified space was Louis Kahn's Jewish Community Center project (1956). Influenced by Mies van de Rohe, the project embraced structural limitations and dared to explore building elements further. Based on observations and case studies, the new interpretation of classical centralized space was successfully created.

Originally written in a collaboration with Robert Slutzky in spring 1955 and finally published in 1964 as an article for 'Perspecta 8', the Yale Architectural Journal, Chapter 7: Transparency: Literal and Phenomenal provided an extensive range of definitions and applications to the key word. According to the Hungarian-American artist Gyorgy Kepes in his book Language of Vision (1944), transparency is an approach to solve contradiction of spatial dimensions. Therefore, when two objects are overlap, one object has to be transparent to allow penetration without being the optical obstruction. A new fluctuate spatial quality with equivocal meaning is simultaneously created from this complex condition. Studies of distinctive architectural design cases and the contemporary Cubism paintings revealed the two significant phenomena: literal and phenomenal transparency. Literal transparency refers to light and airy quality of materials like glass curtain wall that can effectively show aesthetic in a deep naturalistic space. Phenomenal transparency, on the contrary, can be created from an intellectual activity and the organisation of elements in a shallow, abstracted space.

Since the third unambiguous dimension initiated from transparent materials are clearly observable, as seen from the critical analyses of architecture masterpiece comparisons, literal transparency tends to be more successfully created than phenomenal transparency. For example, only a few distinctive cases such as Le Corbusier's Villa at Garches (1927) that the rather uncommon ambiguity of interior and exterior phenomenal transparency can be effectively created compared to Walter Gropius' Bauhaus (1925-26). The analysis of Le Corbusier's the League of Nation project (1927) that was comparable in size and function to Bauhaus building also highlighted Le Corbusier's unique capability to combine various elements to create phenomenal transparency. Interpretations of Cubism paintings were used to further elaborate the concept of transparency. Cézanne and his Mont Sainte-Victoire (1904-06) was the example to show the uses of transparent quality of materials and organisation. Comparisons between Picasso's The Clarinet Player (1911-1912) and Braque's The Portuguese (1911); Delaunay's Simultaneous Windows (1911) and Gris's Still Life (1912) as well as two paintings by post-cubism artists: Moholy-Nagy's La Sarraz (1930) and Leger's The Three Faces (1926) clearly revealed the complex natures of both literal and phenomenal transparency.

Chapter 8: La Tourette was an in-depth analysis of a visit to Sainte Marie de La Tourette monastery (1965-57) built on the steep hill slope near Lyon, France. This volumetric building was an example to show Le Corbusier's progress on analytical design development. It was a combination of two design approaches: large megaron volumes created by the treatment of walls and sandwich volumes based on the new structural system as well as the horizontal planes to form one single spatial volume. This building was designed to correspond with a set of definite religious philosophy and functional requirements. The chosen design representing the feeling of machine esthetic was inspired by the classical Athenian Acropolis as well as the natural setting. Disparity between the complex sequences of physical approach to the monastery and the exterior optical impressions significantly affected visitors' perceptions and thoughts. The combination of the three distinctive elements from a steep vertical surface occasionally broken by horizontal slots and eventually stopped at the top by a bastion that implies the activities inside; a plane that bears traces of imperfection through time and the intentional exclusion of visitors influenced the intriguing interior phenomena like the quivering of light from the round overhead slots or canons à lumière and the general blankness of spectacle representing religious anonymity that made the visitors' experiences even more perplexing.

In Chapter 9: The Architecture of Utopia started with the architecture project realization sequence which is usually recognised as 'ideas before execution'. However, like the case of Sforzinda as the ideal city from the 13th Century Renaissance period, historic documents from the 14th century showed that physical appearance of such cities existed before any distinctive writings about Utopia by philosophers. They appeared in calm settings of non-specific places or locations often in the ideal radius shape inspired by Plato's natural universe, by Christian philosophy and by the military needs of defense. Apart from the physical aspects, utopia was also influenced by cosmic and metaphysical influential issues from artistic theories along with political and social structures. The circular design with new types of urban space and popular style of architecture at the time had continuously been using, as the idea was more widely accepted, up until the late 19th century as seen at Letchworth Garden City in 1898. However, it should not be overstated that every element has to be totally new and revolutionary. Some of the traditional architectural elements, as suggested in the classic literature Citta Ideale, still had been arbitrary incorporating into the city design.

Since the idea of Romantic Individualism, rather than Jeremy Bentham's principles of utility and the idea of Positivism, was favoured by the architects of the 19th century, therefore, the idea of Utopia around this period was still based on the original Italian Renaissance principles. At least it maintained Plato's idea in even more mechanical form but put more concerns on both social wellbeing and personal development as seen in the Happy Colony project (1854). However, it can be said that Modern architecture and contemporary urban planning from the early 20th century and beyond, like Le Corbusier's Ville Radieuse project, was definitely influenced by the idea of Utopia's equivocal nature in physical and philosophical terms of good and evil, freedom and coerciveness. Eventually, the final outcomes of an ideal city were likely to be in classical-oriented static status without the inclusion of historical development or the dynamic changes and natural evolutions. Moreover, the rather closed systems and intolerance to diversity of utopia might also be a significant obstacle to bring the abstract visions into reality. At the end of the day, Utopia can only be created as an effective social metaphor rather than a definite prescription.

Rowe's insightful analysis in various aspects of Modern architecture, compared to the RIBA systematic architecture project development process and the equally methodical process to find the identity of modern Thai architecture confirms that new knowledge can be created as a result from the logical approach. Moreover, all of the key elements have to be carefully selected from the start in order to form worthwhile questions as well as the conclusive theories to be tested in particular context. However, it is the scope of reflection that has to be both comprehensive and profound in order to successfully create new knowledge through systemic analysis.

Reviewed by:

Archan Boonyanan, Ph.D.
Faculty of Architecture and Planning
Thammasat University

References

Brown, T. (2009). *Change by design*. New York: Harper Collins Publishers.

Handy, C. (1991). *The age of unreason*. London: Arrow Books.

Horayangkura, V. (Ed.). (2017). In revealing modern Thai architectural identity. Bangkok: Thammasat University Press.

Royal Institute of British Architects [RIBA]. (2013). *RIBA plan of work 2013*. Retrieved October 5, 2018 from https://www.ribaplanofwork.com.