Research Article

A Study of the criteria used to determine the maximum height of Thai buildings compared with other countries.

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Abstract

The objective of this study was to compare the criteria utilized in Thailand for determining the height of buildings with those employed in other countries. The focus was on the criteria specified in legislation, regulations, height restrictions, and environmental impact evaluations. The research examined pertinent legislation and regulations from foreign jurisdictions, such as the United States and Singapore, in order to make comparisons. This study employed approaches to scrutinize legal papers and information obtained from pertinent agencies, as well as diverse litigation situations that have transpired. The study aimed to enhance comprehension of the influence and implementation of these criteria on sustainable urban development. It was anticipated that the findings will contribute to the refinement of the Building Control Act and construction policy regulations in Thailand, resulting in a more contemporary and suitable framework with reduced conflicts and disputes. This was done by reviewing 7 dispute cases, interviewing 12 informants from public authorities and private companies, and analyzing the acquired data by Analytic Induction technique. Finally, the research proposed anticipated recommendations for enhancing the standards in Thailand to foster sustainable development and fully capitalize on the region's potential.

Keywords: Building height limitation, Building height control, Building height regulation, Building control regulation.

1.Introduction

Thailand has a long-standing concept of controlling the height of buildings using principles such as public roads to control the heights and dimensions of the buildings. (Ministerial Regulation No. 55, 2000), as shown in Figure 1

Due to the reason that the sun and the wind allow it to shine and there is good ventilation, but over the last few decades, the public road used as a criterion has often been interpreted by law enforcement and confused by law enforcement as well, which has caused conflict.

Thailand's National Anti-Corruption Commission (NACC) accused officers of the Pattaya City Hall of permitting the construction of such project buildings by law and the case of a condominium building in the surrounding area of Bali-Hai Pier South Pattaya (Thai PBS, 2023). And in another case, the plaintiff said that his home had been damaged because an officer in the Bangkok Metropolitan Administration (BMA) allowed the building of such a project, and state officials acted unlawfully, which affected the development of real estate business. (Chaimard, 2020). While in many other countries, despite the same basic concepts, in detail the building's height control is not used as much as in Thailand and at present, there are additional criteria that have been raised: solar obstruction and wind change of the area around the building being built. Office of Natural Resources and Environment Policy and Plans (2021, 2024) studied building design that takes account of environmental impacts, such as the use of building patterns that help reduce sunlight obstruction from building construction, Wind changes due to building construction, as well as the existence of laws and regulations that have specific rules concerning the area surrounding the building built, good building designs are designs that take account of the environmental impact. As well, the current regulation of the Office of Natural Resources and Environmental Policy and Planning (ONEP) still makes it difficult and disputed. The case of condominium buildings in the surrounding area of Wong Sawang Bangkok (Administrative Court of Thailand, Red No. S.25/2566, 2023) appealed to the Central Court until the court decided to withdraw the Environmental Impact Assessment (EIA), and there are two court rulings in the case of the use of the judgment of the judicial process in the Supreme Court on the matter of the sunlight obstruction and the change of the wind. (Supreme Court of Thailand No. 3815/2540, 1997; Supreme Court of Thailand No. 2949/2526, 1983)

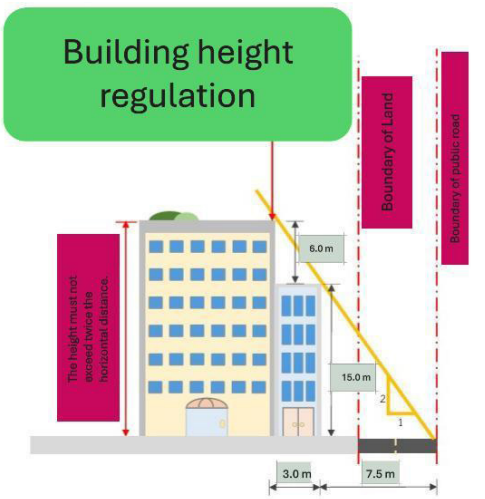


Figure 1. Building height regulation
(Source: Adapted from the Department of Public Work and Town & Country Planning's Handbook,2022 page 42)

This research is therefore intended to study current disputes and principles of building height control by proposing criteria that can be applied, taken into account from the study of individual country height regulation laws, to provide clarity, reduce legal interpretations and disputes, and to have a positive impact on the environment, which is considered an important issue in today's society and scope of the content, by studying the Building Control Act, Supreme Court judgement, Administrative Court order and NACC investigation in Thailand and the laws of foreign jurisdictions, such as the United States and Singapore.

2. Research Methodology

This research concentrated on examining actual case studies of conflicts in the Thai legal system. Consequently, it entailed investigation and analysis under the direction of professionals who create, implement, and follow this regulation and was done by Analytic Induction technique. The researchers collected the important data from the case studies from the disputes found in the judicial courts and administrative courts, totaling 7 judgments, as well as inquiries from the

Table 1 Informants qualification for data collection

Group	Organization	Level	Experience	Number of information
1	Department of Public Works and Town & Country Planning	Director	35 years	1 Person
2	Building Control Officer, Bangkok and Pattaya City	Director and Head Department	15-25 years	7 Person
3	Real Estate Companies	CEO and Director	20-30 years	2 Person
4	Architecture Design and Environmental Consultant Companies	Director	20-30 years	2 Person

Department of Public Works and Town & Country Planning during 2002 to 2023. The secondary data were also gathered from the state agencies, such as the National Anti-Corruption Commission (NACC) as well as from several academic journals and news. In addition, the authors also collected the primary data from 13 informants. Along with data collection from 13 informants through open-ended interview questions. Legislators, government officials, the private sector, and consulting companies served as the informants for this study. Bangkok and Pattaya were chosen to be the areas of study because they have a lot of high-rise buildings and disputes. The qualification of the informants was shown in Table 1

The informants mentioned are involved in the legislation that establishes the criteria for building height, being connected from the initial process to the final implementation of the law regulating building heights. We then analyzed and synthesized the study's results, derived from the collection of secondary and primary data, to formulate significant hypotheses to enhance our understanding of the challenges in its implementation.

3. Documentary Research: Case Studies

Chantarat (2019) revealed several cities in Thailand, particularly Bangkok and Pattaya, are experiencing rapid development. One crucial aspect that influences urban growth and the efficient use of land resources is the regulation of building heights. While laws and regulations exist to govern construction activities, the implementation and understanding of these laws face challenges, including ambiguity, inconsistency, and the involvement of many oversight organizations, as outlined in the Building Control Act.

3.1 Case Study Analysis: Public Road Case

This research article analyzed issues related to building height control in Thailand and offers guidance on how to improve the law and enforcement. Examples have been found, including judicial litigation and officials charged with criminal charges, such as the following case.

3.1.1 The case study of condominium buildings in the city of Pattaya in the area of Bali Hai Pier reports from the NACC revealed that the company submitted an application for building permits to the Pattaya City Hall for the construction of a building. The high-rise buildings in the Bali Hai Pier area of Pattaya are located at the intersection of Pattaya 3rd Road and Bali Hai Road. According to regulation, when building is permitted, the length of the building in the project is about 90 meters long, and the height of the 53rd floor is about 180 meters high. The length of the building section along Bali Hai Road exceeds 60 meters. Therefore, the project building's permission is illegal, (Thai PBS, 2023) as shown in Figure 2.

3.1.2 The case study of a condominium building on Sukhumvit 23 road, Bangkok. The plaintiff claimed that a Bangkok Metropolitan Administration (BMA) officer's approval of the project construction caused damage to his home. The defendants were approved for the Environmental Impact Assessment (EIA) and given the building permission. The committee of environmental experts for the building and an officer from the Bangkok Metropolitan Administration (BMA) were engaged in a dispute regarding the unlawful conduct of state officials. The plaintiff argued that BMA should use Sukhumvit 25 road as the benchmark for determining the building's height, as it

is the closest public road to the building, but the Administrative Court judged that Sukhumvit 23 road is thought to be the most commonly used public road closest to the building because it is the entrance-exit of this building, (Administrative Court of Thailand Case No.S.40/2565, 2022; High Administrative Court, Case No, Red A.300/2556, 2013) as shown in Figure 3.

3.1.3 The case study of a hotel in Bangkok in the area of Wireless Road, when residents around the hotel area accused the owner of the project as the construction was unlawful, because the hotel was located on the narrow roads that did not comply with the Building Control Act. The Supreme Court gave an order to BMA to demolish the 3,000 MB (81 million dollars, 1 dollar = 34 B) project hotel from 18 floors and 24 floors to no more than 8 floors or 23 meters, which stipulates that a building with a public road of not more than 10 meters cannot be constructed above eight or 23 meters high. Because of the measurement, it was found that the road is not more than 10 meters (MGR Online, 2014), as shown in Figure 4.

3.1.4 The case study of a condominium building on Asoke Montri Road was revoked by the Administrative Court due to the land leasing agreement with the Metropolitan Rapid Transit Authority (MRTA). The area of the project road cannot be merged with the land of the MRTA, as the latter is designated for public use and cannot be utilized for private reasons. When the court determines that the project does not include the designated region, it implies that it does not involve the construction of a high-rise building. In order to be considered a valid building exit, these building permits must be completely vacant, (Matichon Online, 2021) as shown in Figure 5

Figure 2. Condominium Project at Bali Hai Pier Pattaya (Source: https://www.thaipbs.or.th/news/content/331356)

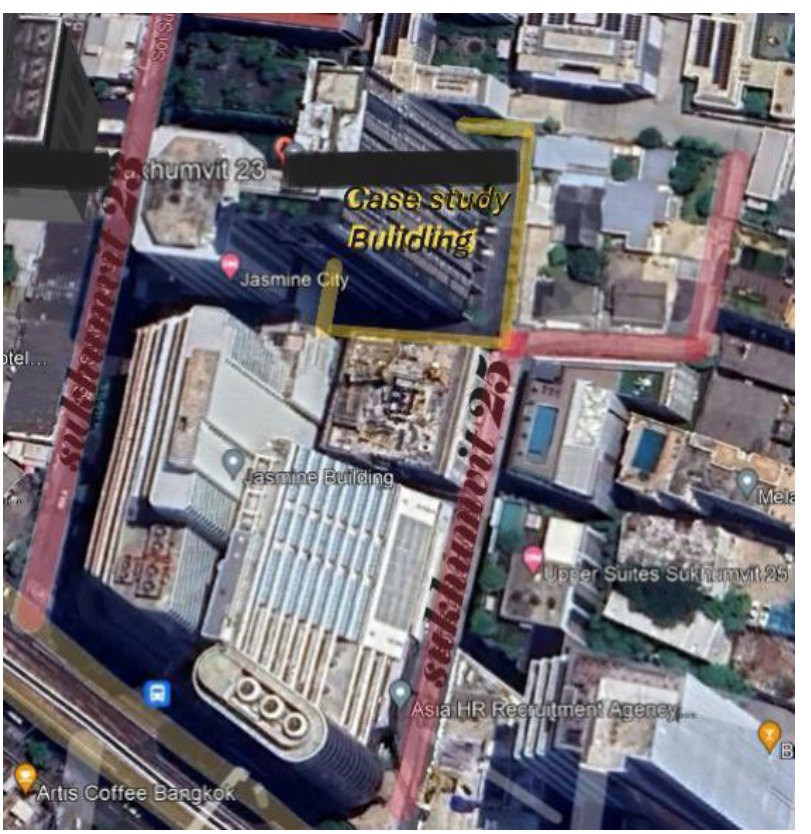


Figure 3. Condominium Project at Sukhumvit 23 Bangkok (Source: Google Maps; retrieved December 2024)

Figure 4. Hotel Project at Wireless Road Bangkok (Source: https://mgronline.com/politics/detail/9570000138842)

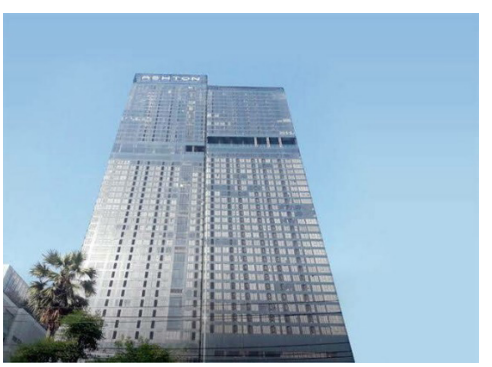


Figure 5. Condominium Project on Asoke Road Bangkok (Source: https://www.matichon.co.th/economy/news_2864948)

The results of an interview survey performed by the researchers using open-ended interview questions suggested that laws regulating building height are not clear enough and hard to comply with. This includes the determination of the surrounding public roads, the identification of the public road that is benchmarked to the building, the interpretation of the width of public roads using information, and the interpretation of land ownership as an exit to high-rise buildings. These complications may result from the interpretation of intricate legal frameworks.

There are some cases where the law and regulations may not be clear enough to be interpreted according to their true intent throughout the years. The Department of Public Works and Town & Country Planning has provided responses to concerns about the private sector's debates of the height restriction of buildings. These questions are required to be replied to in a number of situations, including the following, and also in charge of supervising and organizing the construction of buildings, is frequently consulted by the private sector in situations where the laws and regulations concerning building construction are unclear. They offer advice on matters such as the height limitations for buildings, the use of public roads, the road width, and the legality of having public roads for the purpose of determining the height of a building, whether or not the public roads, the documents provided by the government, the public road area, boundary, and width. (Department of Public Works and Town & Country Planning, 2009a, 2013)

When it comes to providing clear guidance in the context of the public road, rules and regulations might not be as clear as they might be; the department plays a significant role. It does this by responding to conversations on building height limitations, measuring road width, assessing road status, and taking into consideration the legal context and whether or not the public road comes within which case of the building law. (Department of Public Works and Town & Country Planning, 2008, 2009b, 2017)

3.2 Case Study Analysis: Sunlight and Wind

Currently, the study of the sunlight obstruction from building construction and the wind changes due to building construction with adjacent areas are a long-standing problem in many cities around the world. As they have a major impact on the quality of life and urban environments with high density. These problems include the side of Sunlight obstruction. High buildings can block out the sunlight, making the surrounding area darker, which affects the urban ecosystem and the ability to grow

plants. Additionally, a lack of sunlight also results in decreased quality of living for residents. As light is essential for mental and physical health, the side changes of the high building can create a “wind tunnel effect” that changes the flow of urban wind. This change may affect areas. Some parts of the city are less humid than usual, causing a feeling of frostbite and affecting temperature control in the city until the dispute arises. Various studies have conducted these studies, including Development and Design Division (2011); City of London (2017).

3.2.1 The case Study of people in the Wong Sawang District the project appealed to the administrative court until the court determined to withdraw the Environmental Impact Assessment study (EIA) that the authority to extend the duration of the EIA study was exercised. The project was then withdrawn. The council went beyond the time limit that was stipulated by the law, and it did not comply with the procedures that were of the utmost importance. Furthermore, the content of the report did not align with academic principles and facts, particularly with regard to the issue of the direction of wind and sunlight, which would have an effect that would be irreversible on the houses that were adjacent to it. The Administrative Court of Justice issued a judgment with the Judgement No. Black 25/2564 and Judgement No.Red 25/2566, as shown in Figure 6

3.2.2 According to the case study of Judgment No. 2949/2526 of the Court of Appeal, before the building was constructed, the house of the judge received sufficient light and wind from the outside. The building was constructed in residential areas that are not commercial zones and the wind did not penetrate into his house and the light was reduced; the building is much higher than the house. The building built a wind barrier from the south for six months a year and blocked the sunlight until the house needed to use electricity for lighting during the daytime. The owner of the house sued for being harassed.

Figure 6. Condominium Project at Wong Sawang Road Bangkok (Source: https://mgronline.com/politics/detail/9650000123314)

3.2.3 From the case Study of Judgment No. 3815/2540 of the Court of Appeal, Bangkok, a city in Thailand, is densely populated with various types of buildings, including homes, businesses, and other structures. They built their homes on land that is close to the urban and wealthy area. The land costs a lot. Building more high-rise structures is necessary to maximize the benefits. When a house is being built in this kind of building, it should be thought of or believed that there could be a man making a high-rise structure close by. Despite the solid walls and lack of ventilation openings in the high-rise building near this house, wind and light still manage to reach it reasonably well. Moreover, the house already intended to install an air conditioner due to the hot weather in Bangkok, not because the high-rise building blocks the wind. Therefore, the construction of this high-rise building is a reasonable exercise of rights.

Usui (2021) revealed the awareness of these problems has led many cities around the world to implement measures to mitigate the impact. For example, the use of urban planning, zoning regulations and also considering wind currents and velocity by studying the impact of surrounding environments on wind comfort assessment, sunlight and building boundaries. (Du & Mak, 2018; Ricci et al., 2022)

Figure 7. Sky Train in Bangkok (Source: https://www.researchgate.net/figure/The-Bangkok-Skytrain-Above-and-below-the-line_fig1_346833162)

Figure 8. Sunshade from sky train in Bangkok (Source: https://www.thaipbs.or.th/news/content/339323)

Yabuki et al. (2011) used technology to optimize design and building height controls. Looking at the regulations that Thailand has adopted for controlling sunshine and wind changes, it was found the Office of Natural Resources and Environmental Policy and Planning (ONEP) have guidelines that define how to analyze wind and sun in the year 2021 and revised the guidelines again in 2024.

One interesting point is that strictly enforced laws and consideration of the issue of sunshine are very much on public roads, and there are interpretations and controversies as discussed in the case study, but when considering urban development in Bangkok sky train, such as station and tramway design, there will be a lot of lighting block out on public road sections, as shown in Figure 7.

In fact, such shadows reduce temperatures and enhances the comfort of road and public transportation passengers. Meanwhile, high-rise building near the public road might also obstruct sunlight. Which society may be less concerned with the sun shining on public streets than a cold metropolitan country?

According to the motorcyclists on traffic signs must still avoid the sun from buildings and high tramways. Shadows on public roads and some pedestrian paths are consistent with the weather in the country. Thailand is mostly hot and humid all year round, so having a shade on the walkway is what Thai people want for comfort and reduction from high temperatures. If analyzed from Thai behavior, people need a shadow for travel on public roads and walkways, as shown in Figure 8.

But as high buildings are affected, the area and people around the building (not public roads and pathways) are increasing, including communities and the overall environment in the area, such as changes in sun and shadows. High buildings can wipe out sunlight, making the surrounding area less bright. (Prachachat.net, 2021) which may adversely affect the quality of life of residents and the environment of plants that need light for light synthesis, wind change and ventilation. High buildings may cause a "wind tunnel effect" that increases wind speed in some areas at pedestrian level by studying wind environment assessment around a group of high-rise buildings. This affects ventilation and weather conditions. (Qureshi & Chan, 2016)

4. Original of Building Control's Law and

Compared with other countries Thailand's Building Control Act, (1955) is the first concept of height control of buildings with the principle of the width of the road. The Ministry of State has therefore proposed the "Construction Control" which has subsequently improved the height control law. In 1979 Bangkok issued a local legislation enforcing a special height regulation section of building height control The Bangkok Regulations (1979) and, in the same year Thailand issued a new building regulation law to limit the height of buildings throughout Thailand Building Control Act, (1979).

Since 1979 Ministerial Regulation No. 55 Building Control Act "The height of the building at any point shall not exceed twice the distance measured from that point to the scene and the opposite side of the public road which lies next to the building" This limitation has long been enforced to this day is a period of more than 45 years, while there are still details on the corner of the street or the sidewalk, which said the principal risks creating difficulties in interpretation and enforcement. For example, in the case of the study mentioned above.

Building Regulations from other countries. This research focused on the state of New York, USA, as it is considered the birthplace of some of the world's first high-rise buildings. Therefore, it encountered problems earlier than other countries and serves as a model for laws in many countries worldwide. Another country was Singapore, which is a tropical country like Thailand and is known for its strong commitment to the environment and nature. Both are considered because they are developed countries.

United States of America (USA) The United States in New York, Manhattan, is the birthplace of the world's highest and most developed building. The construction of the Woolworth Building and the Equitable Building in 1915 had an effect on the environment, resulting in shadows from the building's sunlight and the cold temperature. During the winter, the streets and pedestals were snow-moist, and the sun could not reach them, thus setting a height limit for the building since the beginning of the year 1916, (Koolhaas, 1978) as shown in Figure 9.

Figure 9. Zoning Handbook 2018 edition NYC Planning (Source: https://www.nyc.gov/site/planning/zoning/zh-2016.page)

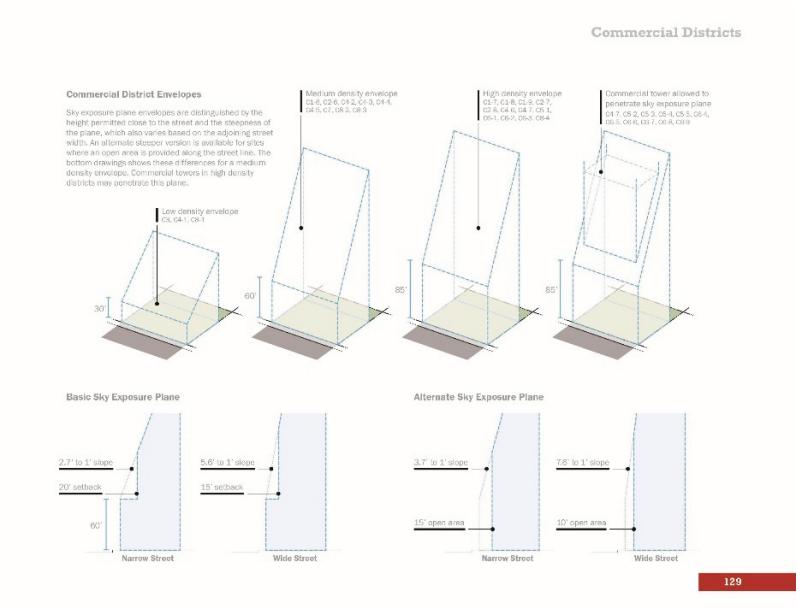
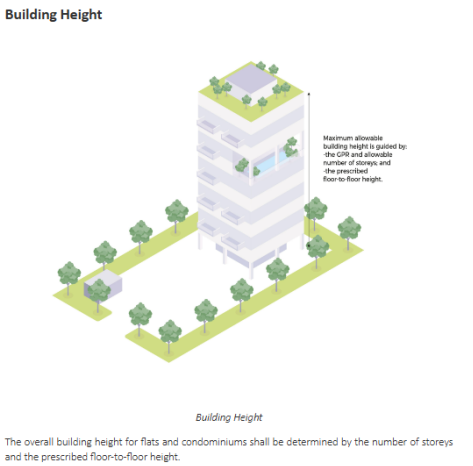


Figure 10. A Sky Exposure Plane (SEP) (Source: https://www.nyc.gov/site/planning/zoning/zh-2016.page)

Figure 11. Urban Redevelopment Authority Mer Plan (Source: https://www.ura.gov.sg/Corporate/Planning/Master-Plan)

The State of New York has zoned in each area where buildings can be built high as an exceptional case. Especially the southern part of Cen tral Park is an area where the law allows buildings to be built higher than other areas. And taking into account that each area has different densities and heights of buildings. In a commercial or mixed area, buildings may be allowed to rise higher. The regulation of elevation and retreat depends on whether the building is located on narrow or wide roads. To allow light and air to reach the road. There have been regulations that control the height of the building, which is the Sky Exposure Plane (SEP), as shown in Figure 10. Generally, SEP starts at a point above the road when the density of a building in the increased zone and the SEP rise would be very convenient for larger roads than narrow roads. In areas with the highest density, with many high buildings, the building would be allowed to be higher than the SEP line. (New York City. Department of City Planning, 2018)

Singapore, as part of Singapore's building control law, is known as the "Building Control Act", which serves as the core of any proceedings relating to building and other construction. The Government of Singapore has established an agency called the Building and Construction Authority (BCA), which is one of the agencies of the government of Singapore that acts as the center for the inspection and execution of all types of buildings and construction in Singapore. The documentation on the website http://www.bca.gov.sg/ provides public access to all construction information from this website, including various building permits. The agency that controls the height of the building is the Urban Redevelopment Authority (URA), as shown in Figure 11.



Number of Storeys

For sites zoned Residential only, the number of storeys for flats and condominium developments shall be guided by the GPR as shown in the following table:

GPR	Maximum Number of Storeys
1.4	5
1.6	12
2.1	24
2.8	36
More than 2.8	More than 36

Figure 12. Urban Redevelopment Authority, Gross Plot Ratio (GPR) (Source: https://www.ura.gov.sg/Corporate/Guidelines/Development-Control/Residential/Flats-Condominiums/Building-height)

The master plan category specifies the Gross Plot Ratio (GPR), as shown in Figure 12, to be used as a criterion for building height consideration as stated om the website by no more of SEP like USA and Thailand Urban Redevelopment Authority (2024).

New York employs a highly structured system governed by its Zoning Resolution, which provides clear guidelines on the Sky Exposure Plane for each zoning of land use. This ensures precise control over building heights to each zone. Singapore uses a comprehensive master Plan developed by the Urban Redevelopment Authority (URA), offering district-specific height limits by GPR while balancing density and livability. Thailand relies on the Building Control Act. However, the framework lacks the detailed specificity of New York or Singapore, often using general determinants of public road width and choosing which public road use to benchmark the building height and also use the same principles of law throughout the country, it is interesting that the context of each area is not the same. The economic center of the capital and the areas in different provinces apply the same height regulation laws while the center of the capital or major cities should allow for high-rise buildings, since it is a business and trade center, which has a high demand. The legislation may relax more limitations on height to support intensive economic development and use, while in the rural provinces these areas tend to have a lower density of population and economic activity.

5. Conclusion and Future Educational Suggestions

The study found that the use of public roads in accordance with the building regulations and educational guidelines and environmental impact assessments, sunlight obstruction from building construction and wind changes due to building construction of the ONEP present at present run the risk of disputes from definition interpretation, discretion and enforcement. From the discrepancy of the officers and agencies reviewed, as well as the judicial processes involved. These resolutions require improved legal clarity and communication between enforcing agencies and all stakeholders. In order to create a clear working framework to reduce disputes that may arise from uneven legal interpretations.

Revisions and modifications to the criterion used to determine the height of building the utilization of public roads serves as a basis for evaluation, leading to disputes, ambiguity, and varying interpretations, thus necessitating careful consideration of the term. “The street that is adjacent to the building and accessible to the public.” These words are included in the Building Control Act. Research has revealed that several countries, including the State of New York in the United States and Singapore, have different requirements compared to Thailand. Thailand is a tropical country with a warm climate; however, it is not as cold as some other countries. The emphasis on sunshine is primarily on public highways. The opposite direction of sunlight also enhances the practicality of utilizing vehicles and footpaths.

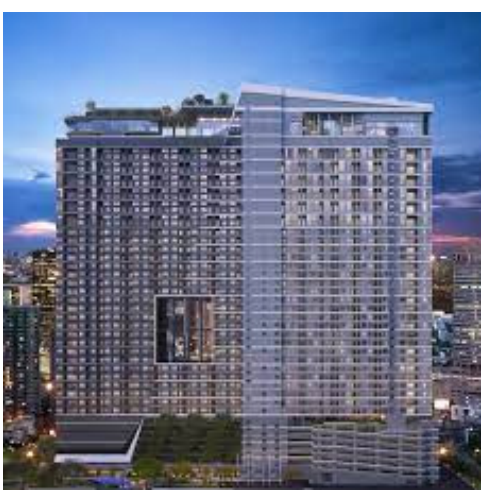


Figure 13. Open void in Condominium Project at RAMA9 Bangkok (Source: https://kellerhenson.com/project/ideo-rama-9-asoke/)

At the same time, higher buildings can have a detrimental effect on the environment by obstructing sunlight and wind change due to building. It has a harmful impact on residential residences and nearby buildings. Cycling negatively impacts the citizens’ quality of life, leading to more discussions. During the environmental study, it is necessary to conduct an Environmental Impact Assessment (EIA) to evaluate the potential effects that structures may have on the surrounding area. Utilizing current technology in building design allows for optimal space utilization and minimizes environmental footprints. If a comprehensive study has been conducted on all buildings, it would reveal the presence of open voids and additional space that facilitate the passage of light and wind, as shown in Figure 13.

This will provide numerous beneficial outcomes, particularly in terms of the environment. Health and economy. Conservation of energy. Architectural structures that are specifically built to optimize the utilization of sunlight and fresh air minimize the reliance on electrical power for lighting and cooling purposes. This results in decreased energy usage and the release of greenhouse gases. It enhances overall well-being. Optimal lighting and proper ventilation in buildings can mitigate the likelihood of contracting respiratory diseases and sick building syndrome. Additionally, these factors contribute to a sense of rejuvenation and vitality among residents. Moreover, they enhance the overall quality of life for occupants and minimize the impact on both the building and its surrounding environment. The area has been linked to nature through natural elements. Creating an open void enhances the feeling of relaxation within the building. Increase the amount of natural light and sunlight. (Gamero et al., 2021)

CRediT Authorship Contribution Statement

Chris Cherdsuriya: conceptualization, formal analysis, writing - original draft, writing – review and editing. Kongkoon Tochaiwat: conceptualization; writing – review and editing.

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