

## PRACTICAL IMPORTANCE OF THE SHAPE OF A TALL BUILDING IN THE CITY SPACE

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### Abstract

The development of construction technology creates ever greater opportunities for designing tall buildings with unusual shapes. So the question remains: what role might the shape of a tall building play in developing a legible and imageable environment?

The paper aims to show the importance of the shape of a tall building for imageability and legibility of the urban environment, on the basis of previously published analyses by various authors, which are part of wider studies on: placemaking with tall buildings, imageability of tall buildings and orientation in the urban space.

The importance of the shape of a tall building is presented in three aspects: its functioning as a landmark, imageability of such buildings and recognisability of a district of the city as well as the city itself.

The unique shape of a tall building has enormous potential for use in creating legible and imageable urban environment. The shape can be used to create distinctive landmarks of different scale and importance to the city.

The location of a tall building with a distinctive shape is important. Constructing such a building in a clearly visible place makes it easy to remember. When such a building is located e.g. at the terminus of a street's view corridor, it significantly contributes to the strengthening of its imageability.

Examples presented in this paper show that single tall buildings with unique shapes are important for the recognisability of a district of the city, and even the city as a whole.

### Introduction

The development of construction technology creates ever greater opportunities for designing tall buildings with unusual shapes. Construction of a tall building with an unusual shape is a great accomplishment of designers and engineers. Such buildings are a showcase and an

advertisement of the companies that have their headquarters in them. Quite often they also serve as residential buildings, hotels and multi-functional facilities. Unusual forms of tall buildings draw attention, arouse interest, sometimes admiration, and sometimes irritation. In any case, they do not leave anyone indifferent. The shape provides a possibility to highlight an important part of the city. The erection of tall buildings with unique shapes next to each other is controversial. However, such a solution seems to be working in certain projects, and may be interesting, e.g. CityLife in Milan. Examples of some cities show that the location of tall buildings with distinctive shapes is left, like the location of other tall buildings, to the market. Sometimes, however, the random distribution of tall buildings with distinctive shapes formed in this way can have a positive role in the urban space. So the question remains: what role might the shape of a tall building play in developing a legible and imageable environment?

The paper aims to show the importance of the shape of a tall building for imageability and legibility of the urban environment, on the basis of previously published analyses by various authors, which are part of wider studies on: placemaking with tall buildings, imageability of tall buildings and orientation in the urban space.

The importance of the shape of a tall building is presented in three aspects: its functioning as a landmark, imageability of such buildings and recognisability of a district of the city as well as the city itself.

### **Tall building - landmark**

According to Lynch the use of landmarks “involves the singling out of one element from a host of possibilities.” (Lynch, 1960, p. 8) The key physical feature of landmarks is “singularity, some aspect that is unique or memorable in context.” (Lynch, 1960, p. 78) Kheir Al-Kodmany claims that due to their distinctive height and good visibility from a distance, tall buildings are unquestionably candidates for landmarks (Al-Kodmany, 2011).

A study by Lynch shows that the list of factors that make a building unique and memorable is open. It includes the shape of a building. Lynch uses, among others, the example of the State House in Boston. The shape of the golden dome, the function of the building, its location at the hill crest, exposure, and visibility from long distances, make this building a key sign for central Boston (Lynch, 1960).

The basis for creating a model of landmark was empirical work by Appleyard (1969, 1976) and Evans *et al.* (1982). The shape is one of the elements of this model. This model is also used in the study of imageability of tall buildings.

D. Appleyard in *Why Buildings are Known* (1969) presented the results of a study aimed at finding such attributes of buildings and structures in the city that attract the attention of residents and remain in their memory image of the city. The study concerned the city of Ciudad Guayana in Venezuela and was conducted in the form of a survey. The buildings indicated by the respondents were then analysed for the presence of a number of attributes, which according to the researchers could be critical for the identification and memorability of buildings. Three dimensions were distinguished: physical form, visibility and significance. The following attributes were listed as the attributes of physical form: movement, contour, size, shape, surface, quality and signs. Subsequently, the correlation between the attributes of the buildings and the recall

frequencies was determined. A high correlation between the shape of the building and memorisation was found. Both simplicity and complexity of the shape can play a positive role; simplicity enables faster perception in situations of limited time, whereas sometimes complexity draws more attention. The visibility of the building is another important aspect. Appleyard's studies have shown that the buildings that are on the axis of vision or crossed the axis while the traveller was turning draw a lot of attention (Appleyard, 1969).

A clearly visible tall building with a unique shape can be a very distinctive landmark. Transamerica in San Francisco is such a building. D. Appleyard and L. Fishman (1977), on the basis of the research carried out in Venezuela, claim that the Transamerica Building will always draw attention, because, in addition to its unique shape, it lies on the axis of Columbus Avenue, the most visible location in the city after that of the Ferry Building (Appleyard, 1976; Appleyard & Fishman, 1977). The shape and location are the two main factors that result in the fact that the building attracts attention and remains in the memory image.

The studies conducted by D. Appleyard (1969, 1976) have been extended by G.W. Evans, C. Smith and K. Pezdek in subsequent years. Evans *et al.* (1982) conducted research in Orange, California. The study was also conducted in the form of a survey. The same three dimensions were used: form, visibility and significance. The study assessed the following attributes of the form:

1. *Movement*. The amount of persons and other objects moving in and around the building
2. *Contour*. The clarity of building contour, ranging from blurred, partially obscured to free-standing
3. *Size*. Vertical height of the building
4. *Shape*. The complexity of shape, ranging from simple block shape to more complex multiple shapes
5. *Use intensity*. The extent of building use, that is, from limited use by a small segment of the population to daily use by large numbers of people
6. *Use singularity*. The uniqueness of building function, ranging from only one function to many buildings with shared functions
7. *Significance*. The extent of cultural, political, aesthetic, or historical importance of the building
8. *Quality*. The amount of physical maintenance, the upkeep of the structure.

The same results were obtained - the same features of buildings proved to be important for remembering buildings. Thus, Evans *et al.* demonstrated that the observations of Appleyard are not site specific and are universal.

The study was conducted in cities without very tall buildings and did not focus on tall buildings. However, according to Ali and Armstrong, the authors of the *Architecture of Tall Buildings* monograph (1995), the obtained results "offer insights about how all buildings, including tall buildings, are remembered." (Ali & Armstrong, 1995, p. 296)

The assessment of the shape of a tall building is of specific nature. In order to determine the shape of a tall building one needs to see it from a distance, in its full glory. If a tall building is located in a heavily built-up area it may be impossible. The visibility of tall buildings located among other such buildings is particularly hampered. On the other hand, when a tall building is

located among low constructions, the visibility of the lower parts of the building is usually blocked by the low buildings in the foreground. All this means that the link between the image of the shape of a tall building with the image of its immediate surroundings may not be obvious. A tall building may be a landmark both as a single building among low constructions, as well as one of the many tall buildings. In the first case, the distinguishing feature of the building is, of course, its height. However, if the building has a unique shape, it is more likely to stick in the memory. Treating the shape as a factor that represents the uniqueness of a building, it can be said that among the many similar tall buildings the one with a different shape than others will be a landmark.

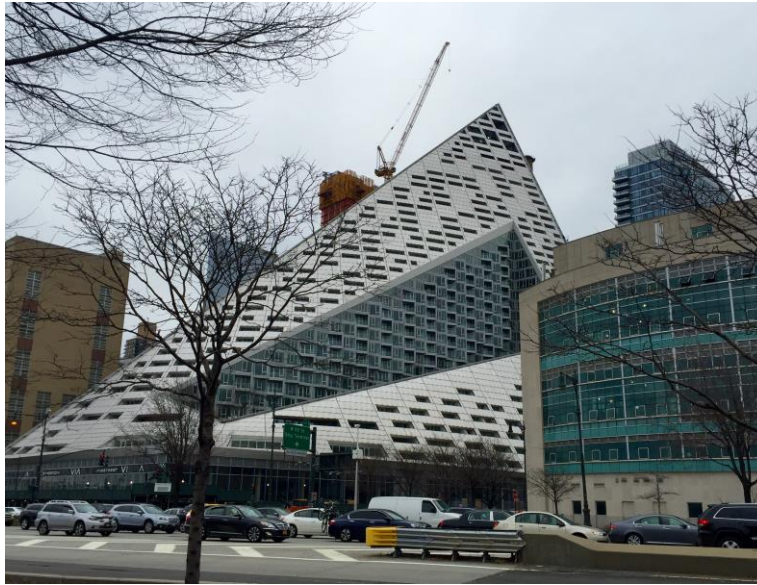
A well-known tall building, which differs in shape from other tall buildings in its vicinity, is the Bank of China in Hong Kong (1990) (Figure 1). The building is designed on a square plan, but the higher parts form triangular segments of different heights. The shape looks as if it was constructed from many triangular pyramids. It can be also said that the building “looks like a three dimensional tangram toy” (Lepik, 2008, p. 110). After the completion of the Bank of China, other buildings of similar height and three higher buildings were built in Hong Kong: Central Plaza, Two International Finance Centre and International Commerce Centre. However the following view remains valid: “Due to its height and unusual shape, the Bank of China is one of the most memorable skyscrapers in Hong Kong.” (Ali & Armstrong, 1995, p. 297)

**Figure 1. Hong Kong. Bank of China among other tall buildings**



**Source:** Photograph by author

Via 57 West in Manhattan is one of the recently built tall buildings with a unique shape (Figure 2). In its surroundings, buildings of different heights, including tall buildings can be found. The new building is distinguished, however, from the surrounding buildings by not so much its height but by its shape that resembles a tetrahedron.

**Figure 2. New York. Via 57 West**

**Source:** Photograph by Anna Drabarek

Evans *at al.* noticed that: "Buildings that are relatively large, easily visible, distinctive in shape, and free standing are better remembered by urban residents." (Evans *at al.*, 1982, p. 234) There are skyscrapers, whose height, shape and location predispose them to be buildings that are remembered. The Shard, the highest tall building built in recent years in London, has a distinctive shape of a pointed pyramid, different than many other tall buildings in the city. At the same time, the multi-purpose building, with a public vantage point at the top, is located in a place that is very busy - in the vicinity of a major junction. All these features make it a distinctive building, easy to remember and functioning as a landmark. However, in its surroundings, it is distinguished primarily by its height.

The results of the research by Appleyard (1969, 1976) and Evans *et al.* (1982) lead to some observations that can be referred to tall buildings with unique shapes. The following tall buildings have been built in Warsaw recently: Cosmopolitan and Złota 44. At the terminus of the axis of Emilia Plater Street, an elegant, tall building with a rather simple shape has been built - Cosmopolitan (Figure 3) designed by Helmut Jahn. It is also visible at the end of Próżna Street. While Złota 44 (Figure 4) with a unique shape, called "Glass Sail", designed by Daniel Libeskind, has been built as one of the buildings on a small street. One can wonder whether placing Złota 44 with its distinctive shape on the axis of vision would create a greater opportunity to use the building as a landmark. The relatively long and intensely used Emilia Plater Street makes it possible for the building to be observed by its many users. G. Buczek (2014) even suggests that locating the tall buildings in place of each other would be a better option; then, on the axis of the street a tall building with a distinctive shape would be located. However, it cannot be denied that due to its height and shape Złota 44 is a characteristic feature of the silhouette of the city.

**Figure 3. Warsaw. Cosmopolitan**

Source: Photograph by author

**Figure 4. Warsaw. Złota 44**

Source: Photograph by author

Landmark is one of the components of the imageable urban environment, and that is why the issue of landmark will be presented in the context of imageability as well.

### Imageability of tall buildings

According to K. Lynch imageability is “that quality in a physical object which gives it a high probability of evoking a strong image in any given observer. It is that shape, colour, or arrangement which facilitates the making of vividly identified, powerfully structured, highly useful mental images of the environment.” (Lynch, 1960, p. 9) K. Lynch lists five main elements of imageability of the city: paths, edges, districts, nodes and landmarks.

The issue of imageability is analysed in many studies devoted to tall buildings. Tall buildings through their size and shape can affect the image of areas of different sizes. Ali and Armstrong (1995) and Beedle *et al.* (2007) understand imageability at the urban design scale as the degree to which the tall building contributes to the overall impression of a neighbourhood, district, or the city as a whole.

M.M. Ali and P.J. Armstrong (1995) on the basis of research conducted by Appleyard and Evans *et al.*, argue that such buildings as Bank of China in Hong Kong, Hong Kong and Shanghai Bank and Bank of Asia in Bangkok, Transamerica Pyramid in San Francisco and Citicorp Building in New York, are among the most imageable buildings, which are easy to remember. According to the authors, this view is justified by e.g. sheer size of each of the buildings, generating heavy pedestrian and vehicle traffic, and consequently high use intensity (Ali & Armstrong, 1995). Each of these tall buildings has its own distinctive shape.

Tall buildings with distinctive shapes are erected in relatively small cities as well. In 2012, in Mississauga (a city, which belongs to the Greater Toronto Area), Absolute World Towers, also referred to as “Marilyn Monroe” towers, was built (Figure 5). Their shape is very important. Among the many quite simple tall buildings, which form their surroundings, the unique shape of the towers draws attention. When we apply the form criteria as specified by Appleyard (1969,

1976) and Evans *et al.* (1982), we can conclude that other factors also affect the memorisation of the building and its imageability: the towers located at one of the main intersections in the city centre, are higher than the other buildings, and have a very modern architecture. Absolute World Towers are visible from many locations and from various distances. Thus, they meet the visibility dimensions. Due to their distinctive height and shape, the towers are also an important and recognisable element of the silhouette of the city, which, prior to their completion, was not distinguished by anything in particular. Initially, the project envisaged building a single tower in Mississauga (*The Global Tall Building Database of the CTBUH*). The visual effect would then be weaker than in the case of the two very similar towers. However, one can assume that due to the unique shape, one tower would also be very imageable and easy to remember.

**Figure 5. Mississauga. Absolute World Towers**



**Source:** Photograph by author

In the discussion on the imageability of tall buildings the shape is one of the main aspects on which Ali and Armstrong - the authors of the *Architecture of Tall Buildings* monography focus. They suggest the use of the typology of shapes proposed by Ch. Jencks. According to Jencks, there are three types of shapes of tall buildings: skyprickers – tall buildings developed from obelisk, spires and pyramids (e.g. Chrysler Building, New York); skyscrapers – with longitudinal, rectangular masses and plans (e.g. John Hancock Tower, Boston); and skycities – combinations of buildings or masses forming tall structures (e.g. WTC, New York). Each of these three types of structures is represented by a number of variants (Jencks, 1980).

Twin towers are an example of skycities (Jencks, 1980). Buildings of this type may have a significant impact on the image of the city. Such buildings evoke strong imageability through special quality of symmetry, aesthetics and mass balancing (Al-Kodmany & Ali, 2013). Twin tall buildings with space between them towering over the city in many analyses are defined as objects that serve as the gateway to the city (Mitsui, 1998; Al-Kodmany & Ali, 2013). The destroyed WTC towers in New York were a spectacular example of the above. Groups of buildings consisting of several towers are also examples of skycities. The three towers of Porta Nuova Garibaldi (Figure 6) in Milan are also a type of skycity. Arched buildings of varying heights are arranged in a circle surrounding the square. Together they form an imageable

element. Although the visibility of this object is limited to certain areas of the city, it provides an interesting terminus for the perspectives of some streets in Milan.

**Figure 6. Milan. Porta Nuova Garibaldi**



Source: Photograph by author

The imageability of tall buildings is analysed together with the symbolism of such objects. The main objective of the research conducted by Krishnan and Ali (2004) was to present tall buildings as objects of multiple meaning; so they can be interpreted in several different ways. Krishnan and Ali consider in the context of symbolism and imageability such aspects as, among others, the strength of the pyramidal shape and analogies to nature. The authors of the analysis notice the relationship between the gopuram and skyscraper. According to Krishnan and Ali, John Hancock Center in Chicago and Transamerica in San Francisco have a pyramidal flavour (Krishnan & Ali, 2004). The upwardly tapering shape of the former tall building can be defined as a slender pyramid with truncated upper part and the latter one is a right pyramid. A pyramid-shaped tall building - Triangle has been recently designed in Paris. One can assume that this building will be a very distinctive element of the image of the city.

The issue of imageability is an important part of the theory of placemaking with tall buildings. The conceptual model proposed by Kheir Al-Kodmany (2011, 2013) assumes that there are four main dimensions, which contribute to the creation of environments that correspond with physiological and psychological needs of people by tall buildings: imageability, human scale, socio-economic and spatial factors and culturally sensitive design. The first dimension was analysed in accordance with the theory of imageability created by K. Lynch, with the use of five elements: path, edge, district, node and landmark. Al-Kodmany, using examples, demonstrated that tall buildings reinforce the imageability of each of the elements of the urban environment (Al-Kodmany, 2011, 2013). The model proposed by Kheir Al-Kodmany was continued in a study conducted jointly with M.M. Ali (2013). The examples show that the shape of tall buildings may be significant for the imageability of the elements of the urban environment.



When researching the imageability of a street, K. Al-Kodmany (2011) listed six spatial qualities (proportion, spacing, alignment, rhythm, coherence and terminus), which have a significant impact on its imageability. In order to ensure a coherent, legible and memorable image, the architecture, style and facades of buildings should be harmonious. Individual buildings can be architecturally interesting, but when placed together they may lack coherence (Al-Kodmany, 2011, 2013; Al-Kodmany & Ali, 2013). It can therefore be logically concluded that the placement of tall buildings with a variety of shapes along a street, results in a lack of coherence and disharmony. Regardless of what one might say about the simple and sometimes very similar shapes of many tall buildings spaced closely along the streets of North American downtowns, they, due to the orthogonality of their masses, contribute to the coherence of the image, as exemplified by, among others, 6th Avenue in New York, with many simple tall buildings.

Another aspect is the placement of a tall building at the terminus of a street. Placing a tall building creates a “visual destination” and reinforces its imageability (Al-Kodmany, 2011, 2013; Al-Kodmany & Ali, 2013). It can be concluded that the placement in such a place of a building with a distinctive shape would be justified. This applies in particular when we considered an important street of the city. Transamerica Building in San Francisco can again serve as a positive example of the above. Placing a tall building at the terminus of a street makes it possible to observe its shape from a distance in its full glory (which in heavily built-up downtown areas is often not possible).

In the theory of K. Al-Kodmany the analysis of tall buildings as landmarks constitutes an inherent part of the study of imageability and, therefore, will be presented in this chapter.

Al-Kodmany (2011) proposes that tall buildings should be divided into major and minor landmarks. The major landmarks are objects that are usually visible from many distances and angles, whereas minor landmarks are visible from limited localities and certain approaches. Both are distinguished by their shape and contrast (Al-Kodmany & Ali, 2013). Wuhan Greenland Center, 636 m high, will become a major landmark in Wuhan, China. The tall building designed by Adrian Smith and Gordon Gill Architects has a slim, elegant, very gently tapering shape (Figure 7).

**Figure 7. Wuhan. Wuhan Greenland Center**



**Source:** © Adrian Smith + Gordon Gill Architecture (Courtesy of Adrian Smith + Gordon Gill Architecture)

Kheir Al-Kodmany's theory distinguishes different types of landmarks: twin towers, gateway towers as landmarks, building's tops as landmark making element. In Suzhou, China – Gate of the Orient, arc-shaped (or gate-shaped), will be an object of the gateway towers as landmarks type (Al-Kodmany, 2011).

In recent years, in Keppel Bay, Singapore, a group of similar tall buildings has been built (Reflections at Keppel Bay). The group consists of six tall buildings of different sizes, but with the same curved shapes. Together they form the imageable element of the bay. Such distinctive group of tall buildings can also be described as a type of landmark.

An important role in the strengthening of the imageability of tall buildings may be played by their tops. K. Al-Kodmany notices that: "Building tops have special role in reinforcing the imageability of tall building because they are readily visible from a distance." (Al-Kodmany, 2011, p. 258-259) One of the recently built tall buildings with a distinctive shape of the top is Chongqing World Financial Center in Chongqing, China. Simple, elegant mass of the tall building is finished with a symmetrical top, but with a rather complex shape. It consists of glass planes bent in different directions. Another tall building with a distinctive top is Signature Tower in Jakarta, Indonesia. Its top, which tapers upwards, resembles flower leaves.

### **Recognisability of district and recognisability of city**

One of the negative phenomena that are associated with the visual impact of tall buildings is the fact that they reduce the uniqueness of the city (Appleyard & Fishman, 1977). The multitude of tall buildings makes cities become similar to each other. In the modernist period, tall buildings called "glass boxes" made many cities similar to each other (Krishnan & Ali, 2004; Beedle *et al.*, 2007). Tall buildings built in the 60s in San Francisco resulted in the fact that the city began to resemble Manhattan. The process was then referred to as Manhattanization. W. Attoe, when analysing this phenomenon, has noticed that: "Whatever had been distinctive about the light-coloured city on undulating terrain was being overwhelmed by anonymous, ubiquitous, highrise boxes built for profit and with no sensitivity to the San Francisco locale and its architectural traditions." (Attoe, 1981, p. 18)

The multitude of tall buildings, however, does not necessarily result in a lack of individual image of the city. The factor that can make the city with many tall buildings a recognisable one is the shape of a tall building (Attoe, 1981; Krishnan & Ali, 2004). According to S. Krishnan and M.M. Ali (2004) the skyscrapers of «look-at-me» and «I-am-a-monument» types are the ones that make cities different. One can distinguish Hong Kong from San Francisco because of symbolic sky huggers such as Bank of China building and the Transamerica pyramid (Krishnan & Ali, 2004). Such tall buildings as Chrysler, Citycorp, Empire State and World Trade in New York, and Tribune, Hancock and Sears in Chicago make areas of Manhattan and Chicago recognisable (Attoe, 1981). The shapes of some of these tall buildings are not very complex, but they are unique. The shape of the Sears Tower (Willis Tower) is considered unique. The shape of the building forms an uneven accumulation of rectangular masses. B. Szmidsztajn describes the Sears Tower as an example of a "game of masses on a panoramic scale" (Szmidsztajn, 1981, p. 252). The fact that these buildings are spaced at some distance apart is also significant.

In recent years, next to the place where the destroyed World Trade towers stood, One World Trade Center has been built (Figure 8). Currently, it is the tallest building in New York. Its shape may resemble a rectangular with bevelled edges along its entire height.

**Figure 8. New York. One World Trade Center**



**Source:** Photograph by Anna Drabarek

If the Chicago Spire is built, it will join those unique tall buildings in the Windy City mentioned above. The building designed by Santiago Calatrava would have a very slender, upwardly tapering, spiral shape. It would be more than six hundred meters high. The building was planned to be built right on the shoreline along the lake, in a rather considerable distance from such buildings as John Hancock and Sears Tower.

The research shows that a single tall building with a unique shape can make a city recognisable. Recognisability of such an object is, of course, facilitated by its large size. It seems, however, that it is not absolutely essential for a building with a unique shape to tower over all other buildings in the city. Transamerica (height: 260 m) is higher than other tall buildings in San Francisco, but the difference in height between it and the second tallest building (555 California Street, height: 237 m) and several other tall buildings is not very significant. It is worth mentioning that currently in San Francisco a building that will be the highest – Salesforce Tower (height: 326 m) is being built. Buildings with a similar height to Transamerica (Oceanwide Center Tower 1, height: 276 m; 50 Mission Street Tower 1, height: 259; 181 Fremont, height: 244 m) (*The Global Tall Building Database of the CTBUH*) have also been designed. However, none of these buildings will be built in the vicinity of Transamerica.

According to S. Krishnan and M.M. Ali (2004), the issue that is important in the context of recognisability is the regionalism of the architecture of tall buildings. There are examples of skyscrapers, whose shapes make cities recognisable and their architecture refers to regional forms. The Petronas Towers in Kuala Lumpur have a regional flavour (Krishnan & Ali, 2004).

One should pay attention to the risk of erecting too many tall buildings with uncommon shapes. They can cause a negative effect. C. Moughtin, T. Oc, and S. Tiesdell, giving as an example as unique a building as Transamerica Pyramid in San Francisco, argue that such buildings can be used to give a unique character to the city skyline, but using them *en masse* could make it trivial (Moughtin *et al.*, 1999, p. 79).

## Summary and conclusions

The presented analysis shows that a unique shape of a tall building has enormous potential for use in creating legible and imageable urban environment. The shape can be used to create distinctive landmarks of different scale and importance to the city.

The location of a tall building with a distinctive shape is important. Constructing such a building in a clearly visible place makes it easy to remember. When such a building is located e.g. at the terminus of a street's view corridor, it significantly contributes to the strengthening of its imageability.

The presented examples show that single tall buildings with unique shapes are important for the recognisability of a district of the city, and even the city as a whole.

Three intertwined aspects of the shape of the building were discussed. A tall building, which thanks to its unique shape is a distinctive landmark, can contribute to the imageability of the city environment. At the same time, the same building, thanks to its shape, makes it easy to distinguish a district or city from others. Tall buildings have practical significance due to the fact that they are landmarks, they reinforce the imageability of the urban environment and contribute to the recognisability of a district or city.

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