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Impact of Tall Buildings on Urban Views - the European Approach

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Impact of Tall Buildings on Urban Views - the European Approach

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Abstract. The research focuses on the visual impact of tall buildings on the city interior space (i.e. streets, squares, undeveloped land, parks, lawns, palace gardens). These are areas where we can experience tall buildings every day. The study searches for relations between tall buildings and their surrounding development that enhance the value of the latter, and consequently improve the quality of the local public space. The research was designed to implement two goals. The first one was to formulate basic rules of harmonious development of tall building and fitting them into the internal cityscape of European cities while maintaining spatial cohesion with the existing housing development, including historical one. The second one was to assess the possibilities and limitations of using digital techniques and 3D city models for objective examination of relations between a tall building and the city (in line with rules defined).

1. Introduction and research goal

A panorama with closely-knit tall buildings has become an iconic view in many cities all over the world. When we think of New York's Manhattan, we see a forest of sky scrapers, we associate London's City with the views of tall buildings seen from the River of Thames, and the same applies to tall buildings in Singapore, Hong Kong, Frankfurt and Warsaw. Undoubtedly, tall buildings are spectacular in such views and they provide a powerful contribution to the image of those cities. However, the everyday experience of citizens in those cities is rather limited to narrower vistas, most frequently individual buildings seen from streets and squares. Such a perception of tall buildings has become a subject of the study presented in the article. Considering the specific landscaping nature and multiple-year history of developing space at the Old Continent, the research area has been restricted to Europe only.

1.1. Tall building as a peculiar form in the landscape

In the past, a tall building, like the tower of a church or a town hall, was a landmark in the space. Standing in opposition to low-rising buildings, it stood out in a landscape of a village or a small town. The effect was additionally boosted if such a building was erected on top of a hill. Usually, roads in the vicinity headed towards such a landmark. It marked the centre of the town, the main destination and a terminating vista. This sort of a code for shaping space was well established and spread all over Europe for centuries. Thus, the view of a tall building became associated with the terminating vista on a given axis. Cullen in his 'The Concise Townscape' [1] wrote about a 'closed vista' as the most obvious manner for closing the perspective of a street by a church or a public building. He also pointed to the 'closure' and 'deflection' (partial terminating vista) as an interesting solution that triggers curiosity [1]. Many streets need a visual interruption that blocks unspecified vista far in the distance, and at the same time,

they strengthen and accentuate an excessively intensive development of a street. And thus, it suggests the closure and singularity of space [2]. In such arrangements, a particular role is played by monumental symbolic facilities of prominent size, richness, grandiose and beauty. Meyer [3] wrote that the monumentalism is rooted in deep layers of human nature. Some of characteristic features include a large scale, prominent location, separation from the surrounding, 'cohesion' of its form, durability and noble materials used, uniqueness etc. [4]. A facility with all those features becomes important, unique and fascinating.

Contemporary tall buildings share at least some of features referred to above. No one can question the impact of sky scrapers large regarding their vertical size. They dominate in the city space and, for this reason, they can be considered landmarks [5]. However, in such an instance, a landmark should be situated in a prominent location. Then, it becomes an element that brightens the urban order [2]. Unfortunately, the location of contemporary tall buildings in a city is frequently determined by a number of overlapping factors and compromises. They are rarely positions according to historical patterns in special locations as regards the overall composition, e.g. hills, next to squares, vistas terminating axes. Another challenge is the recognition of tall buildings in different perception scales. Tall buildings are usually well recognised in wide distant panoramas. However, their basis is not unique and we can hardly link it with the body of a building or the cityscape. According to Lynch [5], we fail to combine pictures at two levels of their organisation, and this makes the urban space less 'imaginable' (or recognised and well organised, and providing useful mental maps of environment).

1.2. Research goal

The research was designed to implement two goals. The first one was to formulate basic rules of harmonious development of tall building and fitting them into the internal cityscape of European cities while maintaining spatial cohesion with the existing housing development, including historical one. The second one was to assess the possibilities and limitations of using digital techniques and 3D city models for objective examination of relations between a tall building and the city (in line with rules defined).

The four rules of harmonious development of tall building and fitting them into the internal cityscape are applicable to the internal landscape (internal vistas focusing on sections of space and individual tall buildings). Such vistas usually include streets and squares but also undeveloped areas, e.g. parks, cemeteries and common land. The study is based on materials and observations made under the '2TaLL Project' ('Application of 3D Virtual City Models in Urban Analyses of Tall Buildings') [12] headed by the author. The 2TaLL study covered several cities in Europe. It enabled to provide a broad analysis of the visual impact of buildings in their physical city space. The study examined relations between a tall building and the development surrounding it, since those relations may enhance the exposition of a tall building and improve the value of public space around it. The second research goal was to adjust digital techniques and 3D city models to make them suitable for the computer-aided analysis. The research examined possibilities of objective analysis according to rules discussed in the article and the determination which of those rules depend on subjective understanding of the urban structure and its composition value.

2. Discussion on tall buildings and urban composition

2.1. The role of urban composition

The urban composition of an area from which a tall building can be seen plays an important role as regards the perception of that building. The relationship between facilities that comprise the background for the tall building and the building (contrasting facility) itself is crucial [6]. Being a monumental facility, the tall building should occupy a prominent position in space. In axial and symmetrical compositions, we may distinguish a point which is important from a formal point of view. Such a point is actually the best location for the landmark facility. From the perspective of the street, it is going to be a terminating vista, and in symmetrical systems, the centre of the composition. If a tall building is not synchronised with the surrounding, the composition is distorted, which has obviously a negative impact

on its perception. A famous example of that is Tour de Montparnasse in Paris (figure 1). The tall buildings interrupt several symmetrical arrangements, such as the view from the Eiffel Tower towards Champ de Mars and the military school. The latter is one of the most prominent locations in the city. It also does not provide an attractive completion of the composition of the street (figure 1b). In 2008, the tall building was considered the second ugliest building in the world [7].

Figure 1. Tour de Montparnasse in Paris is an example of a bad location for a tall building: a) distortion of symmetrical composition of Champs de Mars; b) building is slightly shifted away from street axis

Therefore, the perception of a building is determined by the composition (shape) of public space and the quality of the development in the immediate surrounding from which the building can be observed. Depending on the location of the observer, the building may seem attractive or may not attract much attention. An example of that are the views of the Uni Credit building in Milan (figure 2). The building can be seen as the terminating vista of a street and enhances the perspective as it is an interesting detail (figure 2a). It encourages the observer to walk towards it. In the second instance (figure 2b), the tall building can be seen from a distance as one of several components which stand out in the landscape. However, the composition of the forefront is chaotic and completely not linked with the building. We have an impression that the facility is situated too far, not within a walking distance. The distance seems larger because there is no much differentiation with other objects within our sight. This type of space has been developed to be perceived from a car moving at 60km/h [8]. The street, however, includes a frontage of tenement houses (figure 2a) and this space is arranged to be perceived while walking at 5km/h. An observer has time and possibility to look and notice many architectural details which a linked with their immediate surrounding and the tall building at the end of the vista.

The visual display of a building may indicate whether it is well fitted into the space of a city. If, for instance, ‘google search’ offers attractive pictures of a building and its surrounding taken at the street level, we may assume that composition-wise the building is placed in an interesting location. However, if the space surrounding a tall building does not provide an attractive background, the majority of photographs available are aerial pictures or long distance zooming ins. They present the building as apparently well established in the structure of a city. An example of the above is the Sky Tower in Wrocław, Poland (figure 3). It is one of the tallest buildings in the country. However, it was not placed in an interesting surrounding in terms of it space and functions. Public space around the building is occupied by residential housing development of loose structure. All those factors make it difficult to take an attractive picture from the street level. A wider analysis of the impact of the tall building on the city is included in a separate publication [9].

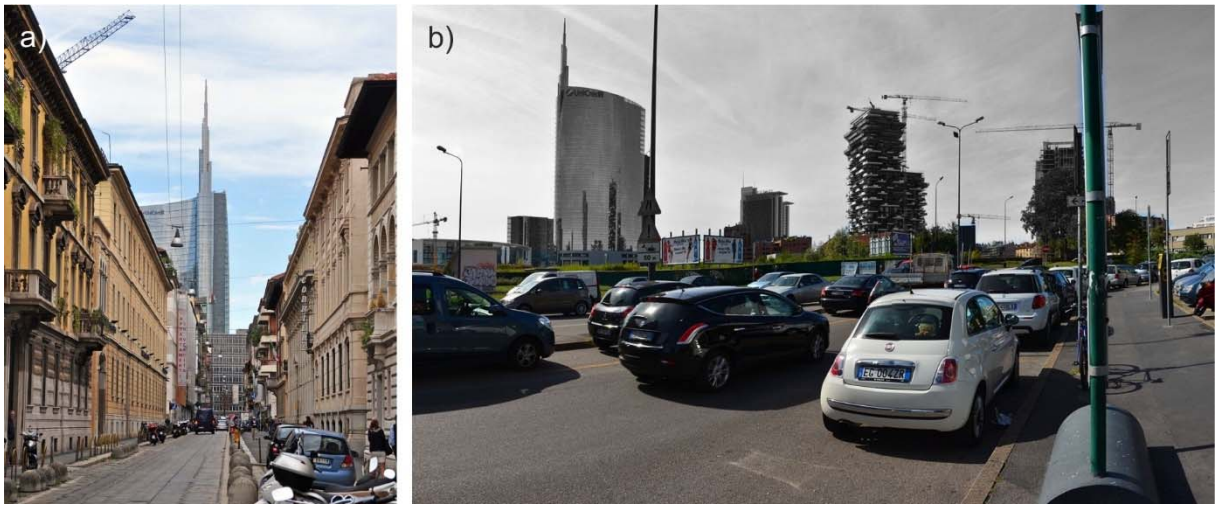

Figure 2. Uni Credit building in Milan – two different urban views: a) terminating vista; b) one of several elements in open and not organised space

Figure 3. Sky Tower in Wrocław (Poland) and its surrounding. Unorganised urban composition of district weakens significance of tall building in space

2.2. Tall building from street perspective

In order to fit a building in the urban structure of a city, one needs to examine whether the surrounding space has been developed following a clear principle and forms an extended urban interior. The arrangement is subordinate to transportation routes and supports movement towards a specific direction. From the composition point of view, we may distinguish two types of street arrangement. Firstly, the build-up development of a street may take a typical spatial form. Walls of an array of buildings form what can be called a 'lead plane' (figure 4a). Such a plane directs our sight towards a significant point at the end of the perspective, or the end of the view axis. In the case of a bent or a broken line of a street, the lead plane is, at the same time, a partial 'deflection' [1]. Such an arrangement is unequivocal and recognisable in space.

Secondly, the arrangement of a street (figure 4b) can be limited to its transportation function only. It does not form a canyon that guides our sight. It is determined by the shape of the road surface only. Buildings and the composition of spatial components are not related to the function of the street. Building facades are not set in a line and do not promote strong relations. Thus, it is not possible to distinguish lead planes and significant points in space. In such a surrounding, a new tall building does not play an important role, as it is the case in the former type of a street. Such street arrangements are

typical for space and roads in modernist housing estates which deviated from the classical (described above) street arrangement (according to rules specified in Athens Charter of 1933).

Summarising, the compacted form of a street strengthens the domination of a tall building in space. However, the location of a tall building in the surrounding matters. In brief, three options can be distinguished (figure 5). The strongest and the most prominent location of a tall building is the terminating vista (figure 5a). Planes consisting of building facades guide our sight towards that important point which culminates the composition. Thus, a tall building gains much importance in space. The urban arrangement can make its rank higher than its mere architectural value [10]. It becomes an interesting visual stimuli, directs movement, and facilitates orientation in space. Situation in which a modern building ends a historical axis seems to be particularly interesting, e.g. Milan (figure 2a). On the one hand, a tall building is the continuation of the urban arrangement, whereas on the other, the 'urban frame' defines its power and significance.

Other ways of positioning of tall buildings presented below (figure 5b, c) do not strengthen the unique nature of a tall building. Although seen from the interior of a street, a tall building situated beyond the frontage (figure 5c) does not belong to it and the building actually disturbs the composition. The same applies when a tall building is situated on the one side of the frontage only (figure 5b) and breaks the symmetry of the street. Figure 6 presents examples of transformations that aim at enhancing the apparent balance along the axis.

When two tall buildings are situated one opposite the other (figure 6a), it gives a sense of balance. Such an arrangement of buildings forms a 'gate' and a frame encapsulating space behind it and at the end of the vista. Cullen [11] distinguishes 'netting' or spatial frames which bring distant views closer and make them a part of the surrounding. Thus, remote details become clearer since they are emphasised by the frame. Such a composition weakens the individual role of each tall building. Tall buildings create a cluster, and the architecture of each of them is less important or unique.

A change in the positioning of a tall building and moving it to the bend of the axis (figure 6b) forms an impression of a terminating vista on the straight sections of the street. According to Cullen, another advantage is that the composition of the street is split and the street becomes cosier. It attracts interest of the observer and encourages them to discover what is behind the bend. Nevertheless, depending on the scale, a tall building may create the impression of a terminating vista (figure 6b).

Figure 4. Difference beteen street defined by façade planes (a), and access road defined by its surface only, without relationship with arrangement of buildings (b). Source: Google Maps

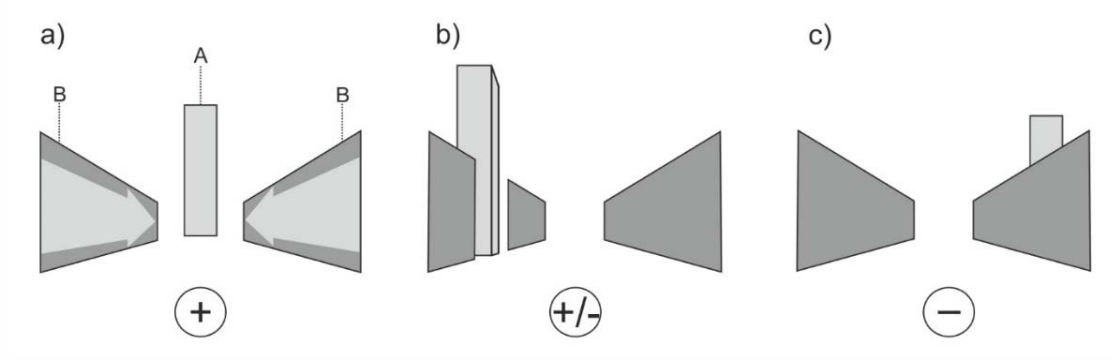

Figure 5. Relation between tall building and other buildings at the same street: a) formally significant position – tall building at terminating vista; b) tall building within frontage as positive or negative element depending on context; c) undesired visual presence of building beyond frontage – distorted street composition. A – formally significant point in composition; B – lead planes

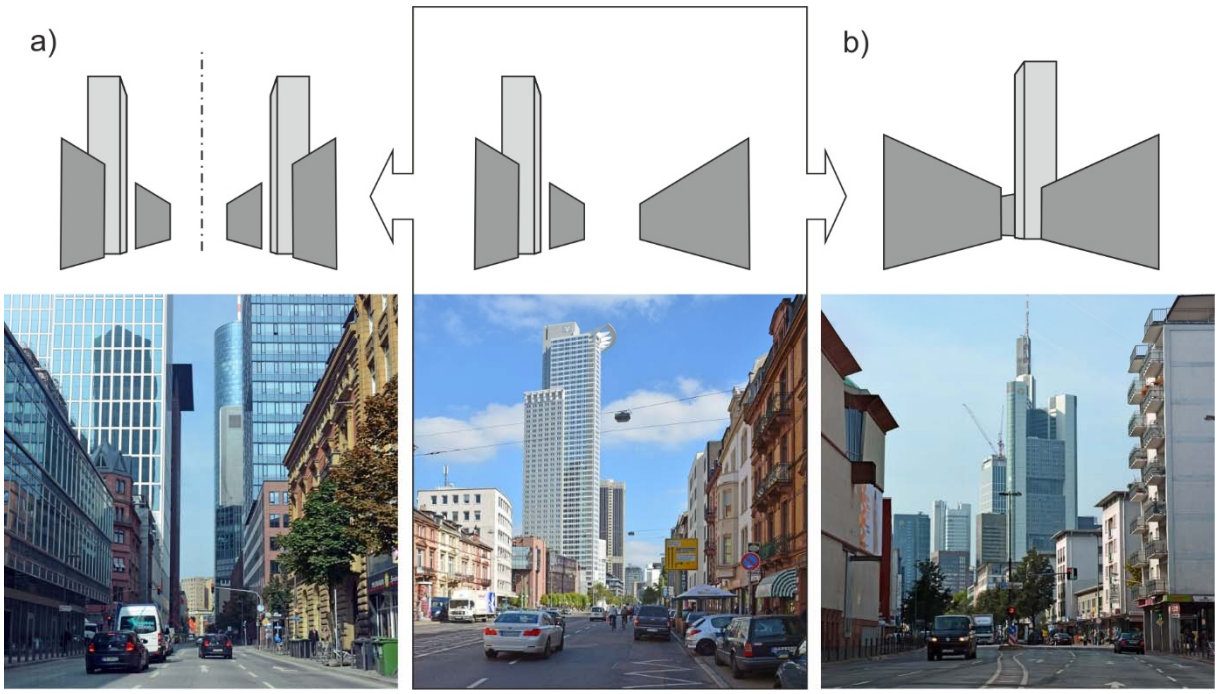

Figure 6. Examples of street composition transformation with tall building with frontage to reach enhanced balance: a) symmetrical arrangement with tall buildings forming gate and frame for terminating vista; b) tall building as partial terminating vista – tall building positioned at bend of street. Below: examples of tall buildings in Frankfurt

2.3. Scale of tall buildings and public space

Apart from the urban composition, the perception of tall buildings depends on their scale (spread) and the development of their immediate surrounding. A common belief is that the public space near a tall building is enlarged and the area at the foot of it becomes depopulated (figure 7a, b). This can be attributed to several factors. The location of a tall building frequently prevents the possibility of developing other buildings in the immediate vicinity as required by law (e.g. obstruction of sunlight). Another fact is that the space at the foot of a tall building is shaded and highly ventilated, which does not improve the comfort for users. Another important issue is the functional diversity of the neighbourhood. If a single function prevails, it boosts the impression of emptiness, e.g. office districts

become deserted after working hours. Maintaining ground floor sections active is a precondition for developing of an attractive public space [8]. Sizes of streets and squares are equally important. Excessively large arrangements are overwhelming and monotonous. Yet another factor is the shortage of small details which change frequently enough during a stroll at 5km/h. Sample photographs depict such differences very well. Public space at the foot of tall buildings in Donau Stadt in Vienna and around Köln Turm in Köln, Germany, (figure 7) was developed from scratch and adjusted to the scale of tall buildings. The building of Commerzbank in Frankfurt has been fitted into the historical old town (figure 8). Its ground floor development has been coordinated with the surrounding and maintains a human scale of its public space filled with people.

Nevertheless, long distances and wide spread views do not always have a negative impact on the perception of tall buildings. Distant views on tall buildings are also an attractive way of exhibiting them. They are, however, possible once we have a large forefront available. Within the internal structure of a city, long and wide boulevards usually promote good exposition and show larger sections of built-up development. The longer and the wider the axial view, the more important it is for the composition of the city (e.g. main traffic routes or kilometres long axes). Tall buildings situated at terminating vistas gain a prominent position and play an important role in the cityscape. An example of such an arrangement is La Défense, a district of tall buildings in Paris. It has been developed at the end of the eight kilometre Grand Axis, comprising important components of the city structure, such as Louvre, Tuileries, Triumphal Arch and Champs Élysées (figure 9a). Such a spatial arrangement enhances the role of the tall buildings district and makes it more visible from a long distance, also from the street level (figure 9b).

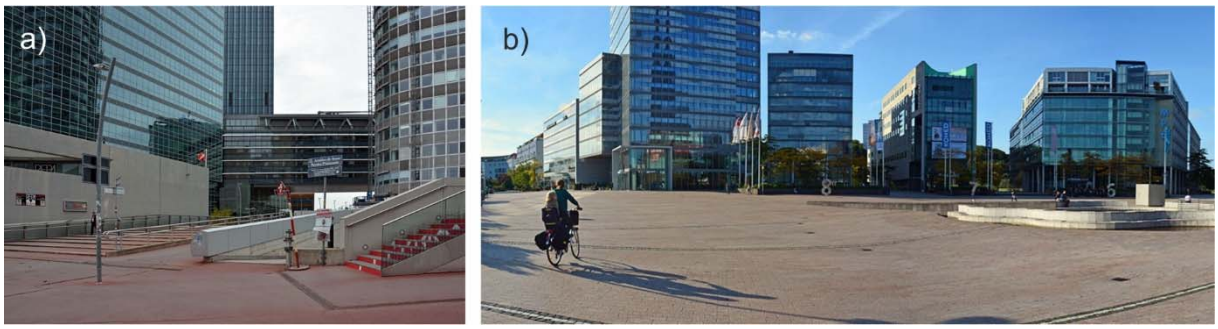

Figure 7. Examples of broad public space deprived of its human scale around tall buildings: a) office district of Donau Stadt in Vienna; b) space around Köln Turm

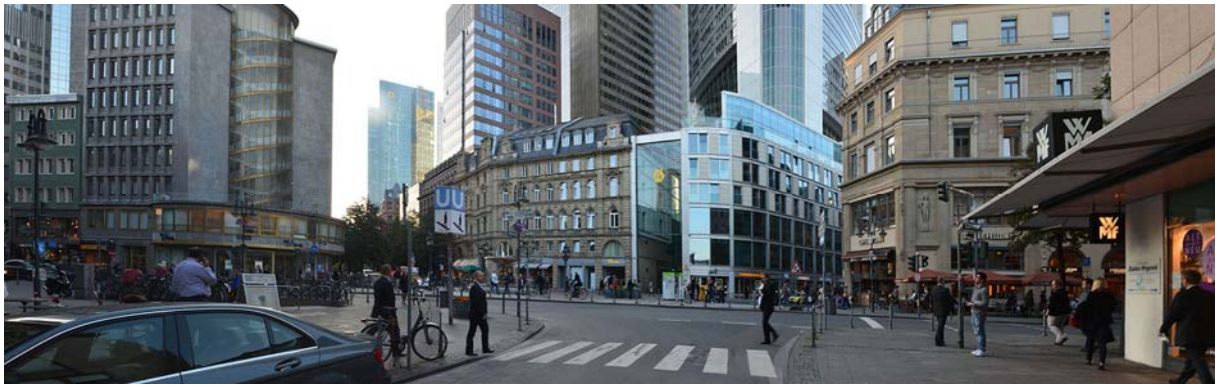

Figure 8. Example of human scale public space filled with people in Frankfurt

Figure 9. La Defense District in Paris seen at terminating vista of Grand Axis: a) view from Triumphal Arch, b) view from street level (distance approx. 4 km)

2.4. Shape and details of tall building

Undoubtedly, an individual form of a tall building has its impact on the landscape. Due to their height, tall buildings are usually observed against the background of the sky. This highlights their outline and proportions. According to Cullen [1], the complexity of details in a building is decisive regarding its uniqueness. This has been confirmed by scientific studies [11]. According to those studies, a special role is played by the crowning part of a tall building. The more complex the crowning, the stronger visual impact the building has. Thus, the Palace of Culture and Science in Warsaw with its characteristic body which becomes slenderer towards the top and contains a large number of architectural details on its façade. Those details also determine the contour of the building and enhance its impact on the cityscape (figure 10). It can be compared to a cuboid (figure 10c). It might be difficult to recognise such a building in the city panorama. It is also less pronounced from the street level. Iconic facilities of characteristic architectural arrangement are recognisable at two levels of perception – distant and close views. This actually makes the tall building and, at the same time, the city more 'imageable' and facilitates the process of creating 'mental maps' of the space [5].

Usually, tall buildings stand out not only due to their height but also simplistic bodies with few architectural details on their façades. Excessive unification of the façade and simplification of the form result in undesired separation between the building and its context. The difference can be particularly vivid in old town areas where tall buildings are collated with richly decorated façades of tenement houses (figure 11). For example, a street in Köln with cathedral towers and a tall building at the terminating vista show the difference in the manner of positioning landmarks throughout centuries (figure 11b). Historical landmarks have well-curved contour and high complexity of architectural detail, whereas a typical contemporary tall building is separated from its urban context by its simple body and few details. Therefore, the increase in the level of detail on façades of tall buildings promotes assimilation of new landmarks and the city, in particular historical buildings situated at the forefront of the vista.

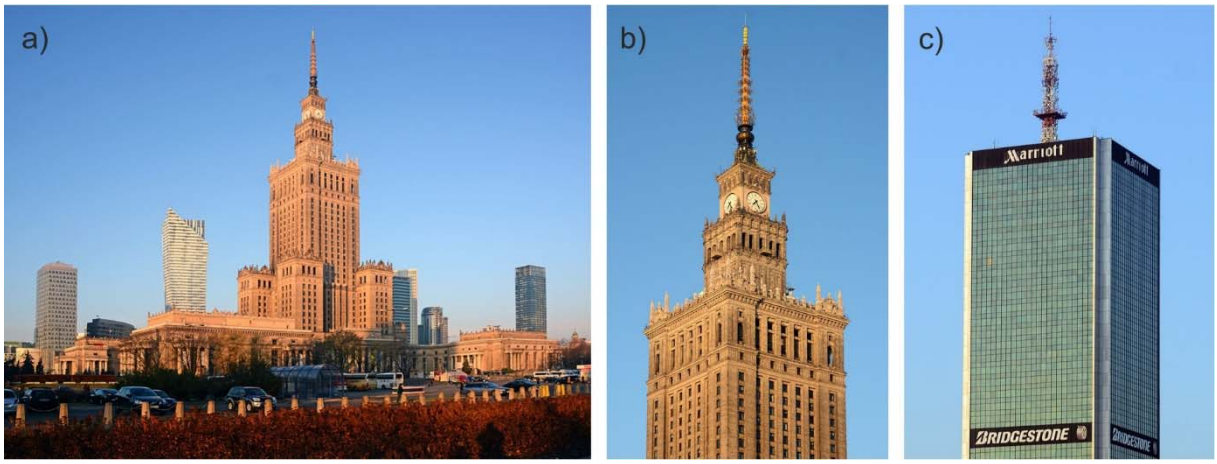

Figure 10. Impact of building shape on its landscape: a, b) Palace of Culture and Science in Warsaw of complex and characteristic contour; c) cuboid-shape Marriott building – little distinct from its sky background

Figure 11. Low visual complexity of tall buildings (expressed in simple form and low level of detail on façades) reveal dissonance with highly complex architecture in foreground: a) Brussels, b) Köln, c, d) Frankfurt

3. Basic rules of a good location of tall buildings

Observations made in several European cities [12] and the general theory of composition enable us to distinguish four basic factors influencing the assessment of tall buildings exposition in internal city vistas (as seen from streets, squares, parks etc.). Those observations can be used for making more informed decisions regarding locations of tall buildings to avoid the diminishing of the value of urban space and to utilise the potential of the urban composition to create a favourable exposition of a tall building. As regards the location, specific factors correspond with those described in chapters 2.1÷2.4. These are merely general composition-related factors that contribute to enhanced order, harmony and cohesive composition of a city.

The analyses indicate the following:

- Major role played by the clusters of buildings, clear urban composition of public locations (e.g. streets with clear lines of buildings, axial development) from which a tall building can be seen;
- Need to incorporate a tall building into the urban structure (formally important position, axial or symmetrical arrangement);

- Necessity to coordinate the range of public space and architectural details to human perception scale ('5km/h architecture');
- Significance of an architectural body of a tall building (preference given to cohesive form with complex contour and diversity of façade).

4. Application of digital analysis for planning tall buildings

In the context of factors contributing to a successful fitting of a tall building into the cityscape, as discussed in the previous chapter, the major question is whether and to what extent is it possible to simulate or verify the outcome by using digital tools? Analytical methods developed by the 2TaLL Project [12], as well as planning experience of the author have proved that digital landscape analysis methods can offer a significant support. An advantage of such methods is the objective nature of findings, which can then be used as a basis for formulating specific planning guidelines for tall buildings.

Issues pertaining to compacted and clear urban composition can be observed during the visual impact analysis, i.e. view shed [13]. The method enables to determine precisely exposure areas for a given architectural facility. The shape and width of the exposure area can be used to define whether a given location has clearly defined spatial boundaries, which are enclosed with façades of surrounding buildings (figure 12). The study was based on the Visual Impact Size (VIS) method [14]. The method defines locations from which a given facility can be seen and, at the same time, the power of its impact (expressed using spectrum of colours: from red to shades of blue, where red represents major domination in space, and blue – minor one).

The examples (figure 12) show how visibility of a tall building influences the space of a city depending on the composition of its surrounding. In Wrocław (figure 12a), the Sky Tower exposure area resembles the effects of a grenade explosion. Due to the loose housing development around, the tall building can be seen from the majority of areas between particular buildings. In Berlin, a hypothetical facility has been placed in the geometrical centre of a square surrounded by compacted blocks of buildings (figure 12b). In areas where houses form a frontage, the exposition area has boundaries defined by the width of streets reaching the square, whereas in areas of rather loose development additional fields of strong exposition appear (figure 12b).

The VIS method helps to control the fitting of a tall building into the urban structure of a city, e.g. between street axes. This can be analysed while taking into consideration several hypothetical locations of tall buildings in the Charlottenburg District of Berlin (figure 13). A change in the location of the building in question has a significant impact on its visibility area. When placed at the very centre of the square, the tall building can be seen along axes of all streets (figure 13a), and the degree of its domination is the highest (marked red). When we place that building within the frontage development we reduce its exposition and domination (figure 13b, c). The building will be least visible when situated inside the block (figure 13d). Such a location does not link the tall building with any of the streets in the vicinity. Similar VIS simulations can be used while determining the precise location of planned tall buildings. Sometimes, a minor change of the location within a plot may produce significant positive effect of the landmark in the urban structure [15]. Axial views of planned tall buildings depending on their location can also be examined using other digital techniques. Figure 14 presents simulations showing the level of co-axial positioning of streets in a given location of a tall building in the centre of Warsaw [16]. Red is used to mark sections of streets that are positioned co-axially as regards the location of the tall building.

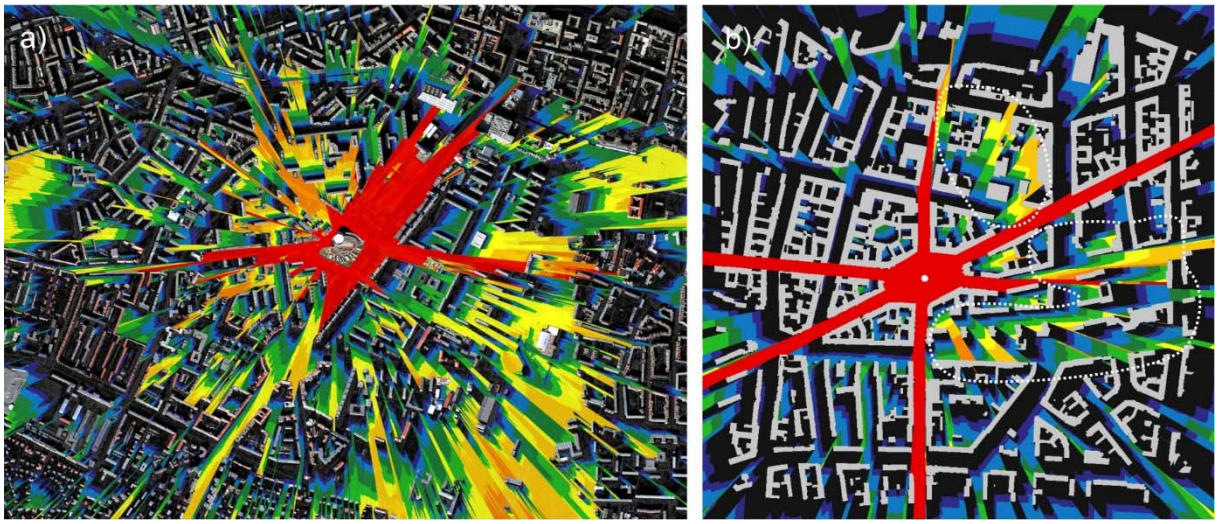

Figure 12. Analysis of visual impact of tall building using VIS method: a) Sky Tower in Wrocław, b) hypothetical tall building at Victoria-Luise Platz in Berlin

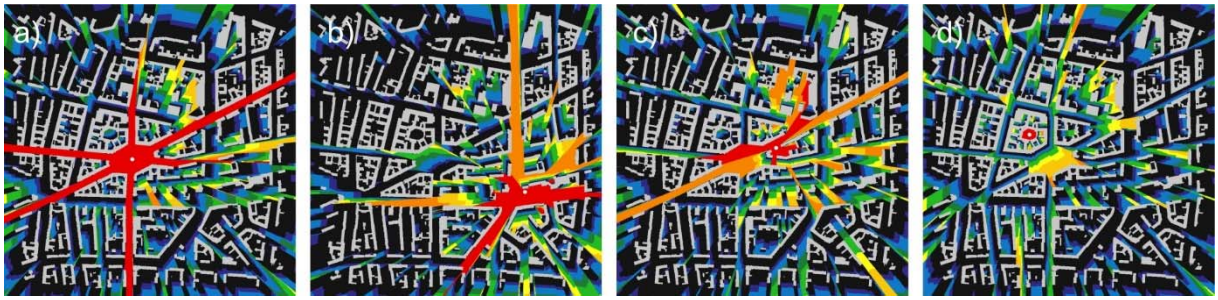

Figure 13. Optional locations of tall building in Charlottenburg District of Berlin. Examining visual relationship between tall building and street axes.

Figure 14. Co-axial positioning of streets and tall building – example of Warsaw

Another issue that can be examined in an objective manner is the determination of the best, or the most prominent, public space in the city. While using an axial map (developed by Space Syntax), we can determine which cross roads in a city are major and contribute to the strengthening of the core city centre [17]. A tall building situated in such an area may gain a prominent exposure. However, the objective assessment of the form of a building is more difficult. Complexity of the contour and diversity of details on the façade can be examined using fractals [18]. Bovill formulated a theory of contextual fractal fit. According to the theory, a landscape is going to be more interesting, if the fractal fit of built features matches the fractal dimension of the surrounding landscape [19]. The method can be used for studying the immediate surrounding context of a tall building and confronting it with the fractal dimension of that facility. It can also be used for the landscape change estimation [20]. Issues pertaining to proportions of public space – their spread and scale of surrounding development can also be examined. The 'Negative 3D' (N3D) method enables to analyse the geometry of space between buildings, heights and spread [21]. The Sky View Factor method analyses the degree the sky view is obstructed in particular views from squares. The sun-hours calculation helps determining the time of their exposure to sunlight [22]. Those factors are important for the assessment of public space user comfort.

The most common technique in the designing practice is the application of city models for simulating the visualisation of a planned building in its spatial context. Objective findings of the simulation depend very much on the precision in which city space is reflected in the 3D model. While determining guidelines for new buildings, in urban planning practice, the 'height lines' method proved efficient. It involves visualisation of spatial measures at the planned location and present the scale of a planned building in a specific view (figure 15). The method is valuable for the analysis of tall buildings [23], as well as low-rising ones, e.g. in locations crucial for the landscape of a city [24].

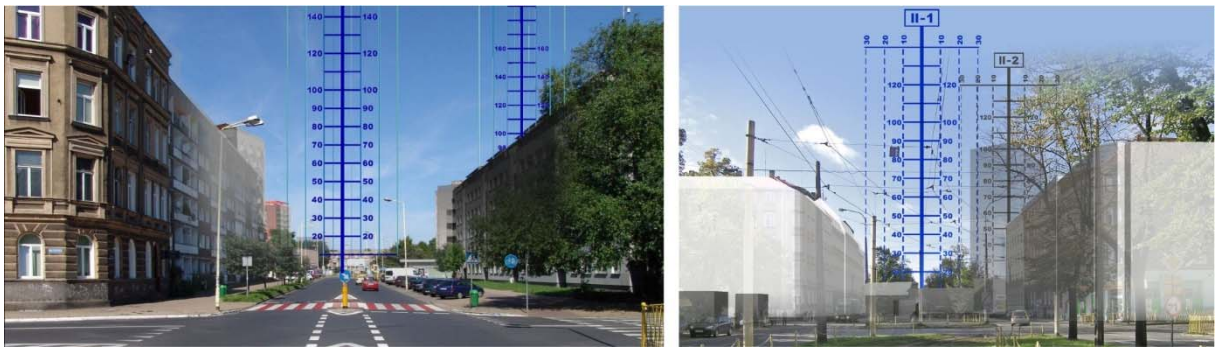

Figure 15. Height lines method used for simulation of planned building's dimensions in real space, [23]

5. Conclusions

Landscapes of European cities have been developed by generations of inhabitants and constitute their legacy. Contemporary investment in many cities progresses without due respect to the value of the existing historical development. This applies, inter alia, to new tall buildings that may cause unpredictable interaction with valuable spatial arrangements. Effects of such interactions can be seen within a distance of several kilometres from the location of a new landmark. In the past 20 years, the number and height of tall buildings have been growing substantially [25]. Considering rapid changes, we need efficient tools supporting the planning of tall buildings in cities to prevent deformation of the urban composition and loss of valuable vistas.

The article formulates four rules of harmonious development of tall buildings within the internal cityscape (as seen from streets and squares). The study is based on materials and observations made under the 2TaLL Project [12] headed by the author. The 2TaLL study covered several cities in Europe. Observations discussed in the article clearly indicate the need to plan the development of the urban space

in line with the human scale and rules created in Europe over centuries, rules which constitute a local (European) code for interpreting urban composition values and their significance in the process of building new tall buildings.

The four rules defining a good location of a tall building are a proposition and a contribution to a wider scientific discussion aimed at improving city planning. Some of the proposed rules can be applied objectively by using computer simulation. The use of digital methods and virtual 3D city models helps examining cityscapes covering vast areas of high complexity of their urban structure and obtain unequivocal results. A good example is the Visual Impact Size (VIS) method. It enables to identify all locations from which a tall building can be seen. VIS findings are geometrically unequivocal and depend solely on the precision of the 3D model applied. A dedicated VIS software [12, 26] provides for the analysis of even very distant locations in the city (for now approx. 100-200 km2) to examine all possible threats to the cultural landscape.

Although, digital techniques (e.g. VIS) provide a strong support while planning tall buildings, they are not sufficient to formulate planning guidelines. The interpretation of results is necessary to understand urban structure and composition values. VIS maps provide knowledge that cannot be predicted intuitively. Computer simulations are geometrically unequivocal. Although the result is not debatable, it requires a professional interpretation focusing, inter alia, on examining axial views and other relations within the urban composition. The second method discussed in the article (figure 14) is dedicated to the analysis of axial exposition. Co-axial landmark exposition can be also studied by objective provided computer aided methods. However, the study is still in its early stage. Although current results are not completely satisfactory, they can support planning.

In the context of the research task, the combining of 'analogue' urban planning tools and computer simulations is definitely advantageous. Both approaches complement one another (in symbiotic manner). Analogue tools are based on knowledge, intuition and understanding of the city composition structure, whereas digital ones deliver precise results extending beyond the range of intuitive understanding. However, computer simulations are 'raw' and without relevant interpretation they have hardly any value for urban planning. The VIS method has been frequently used in the planning process in Poland in such locations as Szczecin [23], Lublin [27], Warsaw [24]. The use of the method led to the implementation of specific measures aimed at protecting of the landscape.

VIS, co-axial streets method and other landscape digital analysis techniques, which concise description has been included in the article (e.g. Space Syntax and N3D), are not exhaustive. Possibilities for creating new computer-aided analyses designed to solve the research problem discussed in the article are many. The assessment of the impact of tall buildings on city internal vista is a complex issue closely linked with the interpretation of the urban structure. The four rules of harmonious development of tall building and fitting them into the internal cityscape is the comprehensive solution to the problem proposed by the author. Those rules can be used at two levels: a) support while solving research problems during planning based on 'analogue' urban planning tools, b) solution indicating direction for developing new techniques of digital cityscape analysis.

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