

PAPER • OPEN ACCESS

## Genesis of Synergy-Problems of Inner Cities

To cite this article: Rafal Blazy 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **471** 112011

View the [article online](#) for updates and enhancements.



**IOP | ebooks™**

Bringing you innovative digital publishing with leading voices to create your essential collection of books in STEM research.

Start exploring the **collection** - download the first chapter of every title for free.

# Genesis of Synergy- Problems of Inner Cities

**Rafal Blazy**<sup>1</sup>

<sup>1</sup> Cracow University of Technology, Faculty of Architecture, Institute of City and Regional Planning A-5, ul. Warszawska 24, 31-155 Cracow, Poland

r\_j\_blazy@wp.pl

**Abstract.** Cities are inherently very dynamic constructs; therefore, many different factors overlap and intermingle within their perimeters. Perhaps very soon we will have to get used to other, multi-level forms of land use. This way cities may obtain new areas of expansion, as well as a new identity and identification. In all multilayer systems due to interrelations between individual factors (elements) each time we deal with a structure exhibiting synergic features. This paper discusses today's tendencies in transforming territories of agglomerations, focusing particularly on the issue and model of spatial synergy in different functional zones of city centres.

## 1. Introduction

Demolition of stereotypical thinking about the city centre and the transfer to (or proposal of) a synergic structure seems to be one of the most important directions in the transformation of contemporary metropolitan centres. Perhaps very soon we will have to get used to other, multi-level forms of land use, along with the necessary stratification in terms of taxes and fees relating to individual levels of the city. This way cities can gain new territories of expansion, as well as a new identity and identification. The prospective vector of transforming contemporary cities can be decided about by the fact that multi-level solutions allow to maintain important existing road connection, at the same time reducing their negative effect on the urban tissue and the life of the city. In all multilayer systems due to interrelations between individual factors (elements) each time we deal with a structure exhibiting synergic features. Simultaneously, maintaining the current tendency of solving problems of road transport by means of excluding subsequent parts of inner cities from car traffic may eventually constitute a considerable restraint for the development of cities. At the same time, to a certain extent. The search of a more coherent development of the urban space carried out in recent years constitutes a clear return to the concept of a 19<sup>th</sup>-century city in a humanised form. The legitimacy of this path will be decided by the extent to which all essential needs of contemporary man are satisfied in the city...<sup>1</sup> At this stage, it is worth reflecting on the basic issues connected with the problem of synergy and the genesis of this phenomenon.

Synergy stems from symbiosis, and it is a type of activity which makes use of similar attributes of elements occurring in the space. It is impossible to talk about synergy in the city without the initial reference made to the notion of unity and integration. According to the Polish language dictionary published by PWN, 'integration' (original: integracja) is: 'firstly, «the process of forming wholes out of elements», and secondly «an economic process consisting in merging enterprises, industries within

<sup>1</sup> Bartkowicz B., *Wpływ funkcji wypoczynku na kształtowanie struktury przestrzennej miast*, Monograph 33, Cracow University of Technology, Cracow 1985, p. 7.



one economy, or economies of individual countries»'. These definitions point to the need to pursue cohesion within a greater organism, which in the case of urban space is a district or a settlement unit. Synonyms of the term 'integration' are 'fusion, merger, consolidation'. Each of these words refers to combining in a very close and unifying way. In living organisms, very often in the moment of fusion the initial ontogenetic features may be even lost in favour of common features. The process of achieving harmony, which stands for agreement and cooperation on a particular level, can take place based on interrelations between individual entities, which in this respect is not a negative property; on founding in a broader or new environment and an attempt to function in combination with this frequently different reality. Finally, in selected circumstances, certain properties could get intercepted.<sup>2</sup>

On the other hand, according to the same dictionary of the Polish language, 'disintegration' (original: dezintegracja) means 'weakening of the integrity or decomposition of a certain structure', 'weakening or decomposition of internal organisation'. In the contemporary city we often observe disintegration processes that weaken the coherence of the urban structure, compositional links, functional cohesion. Disintegration processes are inconsistent with common organisation principles, or even deny the accepted logic of organisation.<sup>3</sup>

Against this background, synergy is a particular form of co-existence and interdependence, characterised by openness of individual elements and exchange between them. This openness should be most of all a functional one, but it should also be a spatial openness of arranged forms, elements, or urban projects. Without unnecessary barriers and spatial limits between individual objects of the created structure characterised by easy accessibility of individual functions. Urban synergy seems to stand for cooperation in spatial and functional terms, maintaining the fundamental criterion of the result acceleration. 'A condition for the phenomenon of synergy to occur is distinctness of the quality of a complex object, distinguished amongst its surroundings, in terms of the sum of qualities of its components'.<sup>4</sup>



**Figure 1.** Example of a synergic structure – railway station in Katowice, comprising also a coach station and a shopping gallery<sup>5</sup>

<sup>2</sup>Integration (Latin: integrare – consolidate), integration in psychology leads to the maximum comprehensive development based on common foundations – values.

<sup>3</sup>In this case perhaps it is worth pointing out that some principles would be necessary, in force within the entire perimeter of the city. In other words, a strategy which would refer to each area in the city.

<sup>4</sup>Hamrol A., 1998, *Zarządzanie jakością. Teoria i praktyka*, PWN, Warsaw, pp. 49-50

<sup>5</sup>As it is the case with many structures of the type, it is a multi-level solution, with a tunnel and a coach station at the lowest level.

In his monograph 'O budowie i synergii wewnątrz urbanistycznych' ('On the Structure and Synergy of Urban Interiors') Aleksander Böhm wrote: 'Man faces chaos in the environment he created, just like once he faced the chaos of nature. Forces unknown to him. It is impossible not to notice this analogy. (...) A question should be posed at this stage: Where to look for traces of synergy in architecture? The greatest opportunities are created by the city. Inside the city countless spatial relations are born, which – when subordinated to a creative idea – bear fruit in the form of a work of art (...)'<sup>6</sup>. This paper refers more to the structure of the city and the emerging tendencies in its transformations rather than to individual types of urban spaces and urban morphology.

## 2. Methodological problems

Most often when we think of synergy, we focus on accelerating and activating synergy, in which a significant role is played by dynamic reactions of a constitutive and harmonising character. Cooperation of a given team has its effect on its efficiency. We often encounter the term 'synergy' in all sorts of revitalisation programmes, when it is regarded as the so-called 'multiplier effect' or 'the leverage effect'.

Sometimes, however, we deal with the Apollo syndrome, which is an effect of negative synergy, where one of the elements due to its position or function tries to gain control over other elements of the system. The simplest one seems to be the synergy of equivalent components or micro components, that is insignificant, minor, and average elements. Additive synergism occurs when the effect is a result of summing up of activities of individual ingredients. We can also talk about hyper additive synergism, when interrelations of individual components get much intensified. These general principles of synergism are worth transferring to individual adjacent urban functions and spaces and examining in this respect. However, it is difficult to assess the extent in which one element influences or intensifies another. Considering common urban planning theories and a certain code of planning rules, the following measures should be regarded as synergic activities: fusion, coordination, activities aiming to increase the effectiveness of individual elements, and integration, mentioned above, leading to complementarity of a selected structure. The final criterion of reference should be a state in which 'a whole is more than the sum of individual components'.<sup>7</sup>

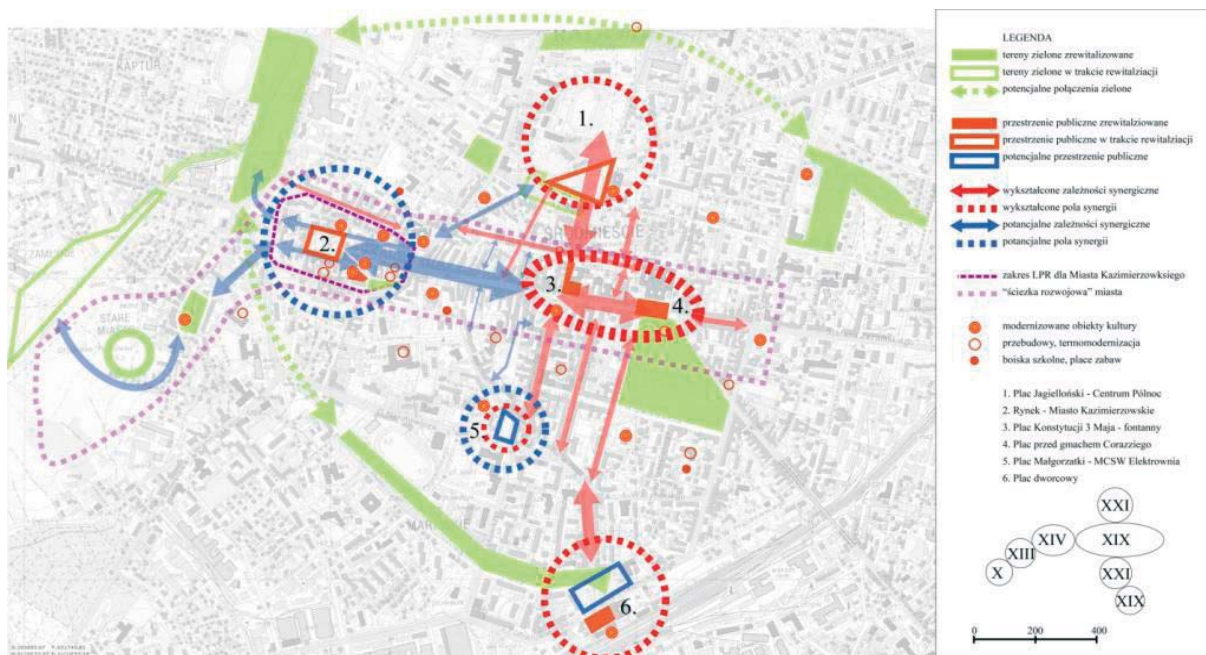
In the conditions of the Atlantic-European culture the contemporary city is usually a formation originating from a planning process. Therefore, when considering the problem of synergism in the perspective of urban issues, first of all we should refer to relevant plans. In this respect the plan of the structure should fulfil the function of harmonising individual functional components of the city, at the same time determining interrelations of elements and setting directions for their development and principles of cooperation of individual units, areas, and strategic points. On the other hand, in the structural approach itself, we can speak of flexibility of the grid and flexibility of the node. In this respect the model type of the grid is important, as well as its density and organisation method. The number of functional weaves in the said nodes seems to be of key importance. The physical number of connections in the node is crucial, as well. Stratified systems should be also allowed in the spatial arrangement of individual networks of interrelations.<sup>8</sup> From the point of view of synergy the greatest integration should take place in nodes of the grid, where additive integration should be pursued at all levels of spatial and functional relations.

---

<sup>6</sup> Böhm A., *O budowie i synergii wewnątrz urbanistycznych*, Monograph No. 6, Publishing House of the Cracow University of Technology, Cracow 1981, pp. 8, 9.

<sup>7</sup> Zuziak Z. K., "O synergii planu w urbanistyce", *Budownictwo i Architektura* 16(1) (2017) pp.183-198.

<sup>8</sup> Gądek Z., "Kształtowanie wieloużytkowych obiektów architektonicznych", Publishing House of the Cracow University of Technology, *Zeszyt Naukowy* No. 1, Cracow 1971.



**Figure 2.** Already formed and potential fields of synergy in the city centre of Radom<sup>9</sup>

**Table 1.** Methods of fighting excessive or insufficient proximity.<sup>10</sup>

Proximity type	Method
Cognitive proximity	diversified, complementary knowledge resources
Organisational proximity	system of loosely connected units (clusters, coordinated business networks)
Social proximity	skilful use of the social capital and combining the anchoring of units and traditions with the market mechanism
Institutional proximity	controlled, sustainable development of the system of institutions, balance between durability and flexibility
Geographical proximity	local relations skilfully combined with external relations

Alicja Zakrzewska-Półtorak from the Wrocław University of Economics emphasised in one of her works that proximity is a necessary condition for the occurrence of the effect of synergy in the interrelations of functional spatial units. Proximity is not easy to define; when we speak of proximity, we most often refer to a small distance between objects. From the psychological perspective, however, it is a lack of 'distance' between individual units – entities that is more important. In the broadly understood science we can talk about the so-called geographical proximity, institutional proximity relating to similar political, legal, or organisational conditions. We also have social proximity,

<sup>9</sup> Figure [from:] Derlatka A., "Synergia jako kryterium oceny projektów rewitalizacji śródmieść", *Budownictwo i Architektura* 16(1) (2017), p. 22.

<sup>10</sup> Boschma R., "Proximity and innovation: a critical assessment", *Regional Studies*, No. 39, 2005, pp. 61–74.



consisting most of all in relations resulting from the level of confidence, loyalty, and culture.<sup>11</sup> According to P. Cooke, geographical proximity can constitute a foundation for achieving many other categories of proximity.<sup>12</sup> Also, proximity does not always translate into the effect of synergy. Scientists stress that urban synergism can be fostered by avoiding the dispersion of objectives. One of such basic objectives should be the common good. It is very difficult to define it; however, it can constitute the foundations for determining detailed objectives of activities undertaken at the level of the city.

In principle, functions as well as forms of objects present in the fields of synergy should create positive interrelations with elements located within a given territory.<sup>13</sup> These should be interrelations strengthening positive effects of other components of the synergic structure. These should be interrelations that do not question the coexistence of individual objects, their function, form, and the development which accompanies them. Synergy can happen even between elements of an urban detail in objects and areas with extremely different functions. Creating synergic relations at the level of an architectural or urban detail is connected with a considerably strong psychological effect on users of a given area.



**Figure 3.** a) –Natural History Museum, Shanghai. Synergy in terms of form combines natural elements with anthropogenic ones, created by man.<sup>14</sup> b) – Synergy of a form of a green garden with a vertical wall of a residential tower – Residential towers ‘Bosco Verticale’ in Milan<sup>15</sup>

<sup>11</sup> Zakrzewska-Półtorak A., “Znaczenie bliskości dla występowania efektu synergii w powiązaniach funkcjonalnych jednostek przestrzennych”, (in:) *Przestrzeń w nowych realiach gospodarczych*, Ed. Korenik S., Hajduga P., Rogowska M., Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, Research Papers of Wrocław University Of Economics No. 408 • 2015, *Przestrzeń w nowych realiach gospodarczych* ISSN 1899-3192, e-ISSN 2392-0041. [http://www.dbc.wroc.pl/Content/32018/Zakrzewska-Poltorak\\_Znaczenie\\_Bliskosci\\_Dla\\_Wystepowania\\_Efektu\\_Synergii\\_2015.pdf](http://www.dbc.wroc.pl/Content/32018/Zakrzewska-Poltorak_Znaczenie_Bliskosci_Dla_Wystepowania_Efektu_Synergii_2015.pdf)

<sup>12</sup> Cooke P., “Bliskość, wiedza i powstawanie innowacji”, *Studia Regionalne i Lokalne*, No. 2(24)/, 2006. pp. 21–47.

<sup>13</sup> Adam Derlatka in his paper writes about synergy fields, providing them with the following definition: ‘Synergy field – a small central operational area focusing around a flagship project, where intensified activities are carried out taking the form of interrelated projects’. According to the Author, the synergy field could be any type of area where actions and relations are undertaken that strengthen the interrelations of individual elements or projects. Quote [from:] Derlatka A., “Synergia jako kryterium oceny projektów rewitalizacji śródmieść”, *Budownictwo i Architektura* 16(1) (2017), pp. 19-28.

<sup>14</sup> <https://www.designboom.com/wp-content/uploads/2015/04/perkins-will-shanghai-natural-history-museum-china-designboom-01.jpg>

<sup>15</sup> [http://www.gaggenau.com/store/cms\\_media/a15/media/\\_remote/\\_master/content/02\\_living\\_and\\_cooking/vp08\\_architecture\\_and\\_spaces/cc0824\\_bosco\\_verticale/cc0824\\_1.jpg](http://www.gaggenau.com/store/cms_media/a15/media/_remote/_master/content/02_living_and_cooking/vp08_architecture_and_spaces/cc0824_bosco_verticale/cc0824_1.jpg)

### 3. Problem of housing and services

Cities are inherently very dynamic constructs, and therefore many different factors overlap and intermingle within their perimeters. The balance between service functions, business, and residential functions is like the synergy between a purely practical function with the landscape function. It seems that the measure of a correct spatial and functional structure of the city is largely a balance between individual functions, which is directly linked with the balance of objectives and priorities of the spatial policy. With reference to city centres, in the Author's opinion the sign of a synergic structure is high intensity of the urban tissue along with the use intensity resulting from the number of users availing themselves of a given place, with relevant efficiency of the public and individual transport system.

Thorough modernisation of old housing resources within 19<sup>th</sup>-century city blocks undoubtedly broadens functional possibilities of the city centre, but it also increases the development standard, at the same time changing the type and quality of the space offered for letting. This way the measurable volume of space in the inner city increases, which entails certain non-measurable benefits, as well. Usually due to such measures spaces which used to be quite ordinary assume a more representational character, making use of their historical and cultural potential. Simultaneously, certain classicism of the architectural forms becomes a good foundation for conjuring visions of stable and well-grounded business entities. Nevertheless, supplying new resources of space in the old tissue is quite costly; therefore, with their development in mind, the system should be based on relevant tax incentives, as well as financing procedures, which would complete and support initiatives of small and local business entities. Cities should include in their revitalisation programmes a permanent strategy of developing and activating mechanisms of reconstruction of city centres, which should be compiled and completed on a regular basis. Quite an important, although often disregarded fact, needs to be emphasised here: for synergy in a given area to happen, first there must exist the synergy of entities which utilise selected parts of the area, that is entities which are legally authorised to invest into and administer parts of the space. In the Act on Real Estate Management such entities are dubbed 'independent land or property owners'. They are entities which actually have the right to make decisions relating to the form and development of individual plots of land and structures within the perimeter of the city. Experiences in the field of social economy teach us that sometimes all is needed is a thought-out inspiration stimulating specific activities aiming to combine different functional elements located within the territory of one city quarter, block, or building.

Consolidation of different activities in the city may dovetail with its technical solutions, making use of software and instrumentation used in the smart city. Separation of office functions from residential ones does not foster living in the inner city. The provisions postulated by the Author in local spatial development plans, relating to the need to maintain e.g. 5% of floor area in office buildings for residential functions, may considerably contribute to overcoming the mono-function of financial and business centres, displacing residential functions, which are inherently less economical and expansive. Relatively simple synergic effects can be obtained in conditions of a high degree of behaviour changeability, predominantly in areas which are easily adaptable, such as the aforementioned extensive office spaces, old industrial areas and facilities, and old housing resources. When pondering on synergy in the urbanised space, especially in city centres, we should pay attention to the possibility of conversion of residential resources into service spaces. It should be also pointed out that generally speaking forcing diversification of urban functions has a beneficial effect on deglomeration of the car traffic in the city. Strengthening of diversity of the offer of services of local quarter centres constitutes a return to the concept of a settlement unit with its complementary system of services. It is also a solution which reduces the need to commute to the city centre in order to satisfy one's current needs.

As social needs change, inner cities should be rather spaces where we can constantly observe something that resembles 'neo-colonialism'. These activities should definitely provide them with a new, more contemporary identity; it does not mean, however, that centres of historical towns and cities should not simultaneously remain witnesses to the past, exhibiting their characteristic features adequate to old towns and cities. Respect for the development structure and tissue should be

accompanied with reconstructions of interiors of buildings, especially in areas where the last three decades have not seen any spontaneous bottom-up processes of renewal and revitalisation.

A characteristic feature of synergic structures is considerable development intensity, programme diversity, and concentration of activities. Relaxation of the intensity and accumulation of service, office, and commercial functions should take place in stages; initially at the contact point of the central zone with the downtown area, and next in the moment of definite relaxation of the urban tissue within the perimeter of suburban areas. As the indicator of the land use concentration is the aforementioned plot ratio, inner city areas and city centres should be characterised by much higher intensity than suburban areas. Traffic links can also have a very high degree of development intensity; according to Zbigniew Zuziak the plot ratio value for such areas can reach 15.<sup>16</sup>

In the phenomena described herein it is important that there is constant mutual intensification of social, environmental, cultural, spatial, and economic aspects, which will provide the foundation for optimisation of ongoing processes. In such conditions one can truly speak of a synergic effect of a given area.



a)



b)

**Figure 4.** a) – A house built over a highway in Berlin. Schlangenhader Strasset, broadly known as ‘the snake’, is in fact a housing estate erected along the A104 motorway in Wilmsdorf, one of districts of Berlin.<sup>17</sup> b) – A part of a built-up space over the tunnel on Gen. J. Ziętka Roundabout in Katowice, along with the greenery that accompanies the exit

#### 4. Transport-related problems

When designing contemporary city centres, we often forget that within their perimeter there are predominantly two very different ways of moving around: on foot, and by a motor vehicle. These two types of traffic require completely different scales in spatial solutions. The scale of the pedestrian is closely connected with his mental and physical capacities and with the way he receives impressions through his senses. The scale of the passenger in a vehicle, on the other hand, is based on the speed of the vehicle and the way it moves. Adjusting the city to the requirements of the developing transport system cannot put an end to its human scale and character. There are considerable differences between a slowly walking pedestrian and a person driving a fast car. Introduction of the scale of a motor vehicle as a dominating point of reference for the entire city hides in itself the foundations of the cult of machines. For ages the pedestrian scale shaped the character of the majority of city centres. Maciej Nowakowski in his book *Komunikacja, a kształtowanie centrum miasta* observes that attempts to create a universal spatial scale of the inner city, by necessity adjusted to the vehicle scale, are wrong

<sup>16</sup> Zuziak Z.K., *Strategie rewitalizacji przestrzeni śródmiejskiej*, Monograph; 236, Publishing House of the Cracow University of Technology, Cracow, 1998, p. 39.

<sup>17</sup>[http://1.bp.blogspot.com/-J1JTo\\_MTDOY/UjSREv\\_L0AI/AAAAAAAAEQ0/NtiqISVgPn0/s1600/Wilmsdorf\\_03.jpg](http://1.bp.blogspot.com/-J1JTo_MTDOY/UjSREv_L0AI/AAAAAAAAEQ0/NtiqISVgPn0/s1600/Wilmsdorf_03.jpg)



for many reasons.<sup>18</sup> A person driving in a fast car is deprived of the opportunity to observe details and has no time to look at selected details and buildings. Driving fast forces them to perceive constantly changing images and plans, consisting mainly of upper outlines of buildings and their silhouettes. A driver can see only the macroscale of world around him. And this is one of the reasons why carriageways intended exclusively for cars do not constitute a very good solution, due to their exclusivity in terms of the transport function they fulfil. This way roads are not subordinate to any of the other elements making up the structure of the city.<sup>19</sup> In terms of pedestrian's privileges in the city, most certainly people should not be punished for stepping onto the street suddenly, this rule is applied in many countries and is based on the so-called common sense of the pedestrian. Implementation of such a law has an additional effect – recognition of the fact that the street is not addressed exclusively to cars.

From the point of view of functional issues of the city, public transport routes are extremely important as they 'supply' people, who move around in the city centre on foot, filling the space of the city. Nevertheless, transport solutions often entail many negative spatial effects. One of them is the disruption of the continuity of the existing structure. Breaking the existing urban structure should be always connected with linking it. Most frequently a certain fragmentation of the structure is caused by not particularly fortunate transport solutions, whose only fundamental advantage is the improvement of traffic. Traffic corridors cutting into (cut out in) the existing tissue deform its initial form.<sup>20</sup> Linking individual fragments of the urban tissue seems to be difficult as usually it goes beyond the limits of one investment project. Building coherence of the city should inseparably connect physical proximity and compositional in separateness. Not only does generating mutual relations change the appearance of the city, but it also elevates the existing spatial relations to a higher level. Harmonisation of the new with the old, which links and consolidates urban areas, spaces, and buildings, can transform the existing 'spatial mixture' into certain composite characterised by properties better than individual fragments of the urban microstructure that build it.

Despite the fact that we regard streets and roads in universal categories and we silently accept their technical solutions, there is no reason why diversity of the envelopes of roads and of the urban detail within their area should not be an individual attribute of such spaces in different cities. A certain type of locality in designing envelopes of arterial roads has a significantly better effect on the identification of such places and their aesthetic reception, predominantly by non-professionals. Besides technical guidelines, traffic routes should be given compositional guidelines in local spatial development plans, which are to determine the form of their envelopes and the way of inscribing them in the existing tissue. Essential measures in this respect seem to be road envelopes, embedding roads in the ground and covering them with public, service, and even residential spaces, green areas and terraces, as well as falling greenery - in general, multi-level solutions. This way the network of interrelations should accumulate itself in the third dimension, leading to visual and spatial integration.

The land saving principle leads to more compact and intensified solutions. Gradually, greater intensification of the urban space should come into being, shortening distances between individual structures. Therefore, legal regulations relating to covering spaces above traffic routes in cities are necessary. Today there are no regulations in force in Poland as to the ownership and ways of lending for use or providing access to spaces above the ground level. In the real estate management, in principle the ownership right relates to the space from the ground level upwards without any limitations. There is a definite need of regulations that would govern the ownership right underground and above the ground level. Władysław Czarnecki believes that the best solutions are achieved when

<sup>18</sup> Nowakowski M., *Komunikacja, a kształtowanie centrum miasta*, Arkady, Warsaw 1976, p. 90.

<sup>19</sup>A municipal avenue is a long forgotten solution. Nevertheless, it is worth coming back to proven solutions, where quite heavy traffic is accompanied with greenery and a pedestrian route. Solutions where an area leads to an important building (an office, a school, a hospital, a research centre) are well known. This solution combines the functional motif with the transport-related one.

<sup>20</sup>In some cases one-way lanes can be better as they occupy less space and do not cut the urban space so much.

transport routes junctions are located in a land hollow.<sup>21</sup> Furthermore, he writes that if the junction is designed in a hollow, we obtain a more private interior, limited with slopes or walls, constituting a uniform and homogenous whole with a specific landscape composition. For pedestrians, this underground solution constitutes an intriguing level of a different urban reality dedicated to the car. This concept follows the model of systemic solutions of the S-Bahn trams transforming into U-Bahn when they go underground (Berlin, Hanover, Munich). Therefore, a car entering the city territory should move in the underground space as much as possible. Highways in their current form on the level of the ground should not intersect city centres as this function is inappropriate for the inner city. Despite the fact that each excavation is a certain deformation interrupting the continuity of the surrounding landscape, and the interior formed in the excavation surrounded with slopes will always be separated from its surroundings, a small specific interior complex can come into being in the excavation, with some characteristic fittings appropriate for its function.

An antidote to the situation of congested centres of contemporary cities is a city of 'short distances'. To a certain extent this problem is also connected with the concept of the 'accessible city', that is a city which is achievable and accessible most of all to a pedestrian, but also to a cyclist. The method of shaping public spaces around buildings and traffic routes should encourage to choose walking or cycling. When stimulating the life of the city, we should create spaces accessible exclusively for pedestrians, e.g. recreational areas dedicated to 'rambling' downtown. There is no doubt that pedestrian routes along with cycling lanes should become important traffic routes in the city.<sup>22</sup> The continuity of public spaces of the city should be designed in symbiosis with the continuity of cycling lanes and pedestrian routes in the city.<sup>23</sup> The problem is maintaining relative intensity of the pedestrian traffic in the area of large traffic junctions, which due to the distances which need to be covered will encounter certain physical and mental difficulties. So as to shorten distances in traffic solutions, the subject literature proposes diagonal routes, allowing to change the direction at the same time. Additionally, services are provided at the crossings for safety reasons and in order to improve the attractivity of the area. Therefore, it should be decided whether when designing large service centres it would be justified to extend and prolong their functional programme in the form of enveloped connectors going beyond the roads located in their vicinity. Such a solution is applied in a shopping gallery in the centre of Zabrze ('Zabrze Gallery').

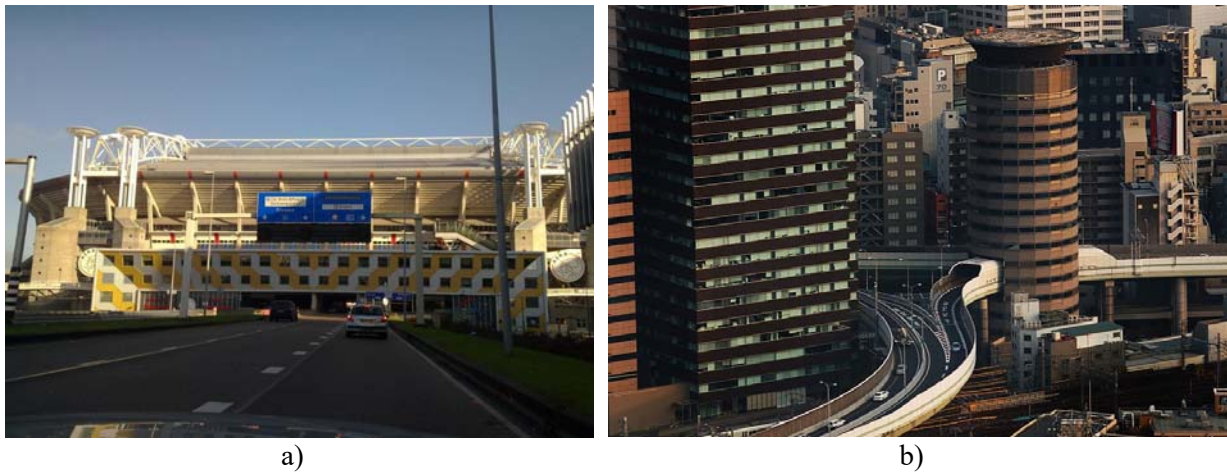
Most probably we need to get used to urban structures as multi-level areas; the theory of perception for some time now has been talking of the city at the level of human eye, the city at the level of the pedestrian, the city at the level of the cyclist, the city at the level of the car, the city at the level of infrastructure. Such an approach forces us to think of the spatial structure in a multifaceted way, sometimes as planes which are independent from each other, and yet which influence each other. This concept should be implemented most of all through the development of the city 'inwards', along with its intensification and the accumulation of the urban structure. Such pursuits promote the principle of a compact structure of the city with its complexity and multidimensionality. It is definitely important that the integration of the urban tissue above arterial roads should be more and more intense, by means of building a grid of links crossing streets and railway lines.

---

<sup>21</sup> Czarnecki W., *Planowanie miast i osiedli*. Volume 1, PWN, Warsaw 1960, p. 71.

<sup>22</sup> Shortening spatial distances by means of improving the attractiveness of its sections, as well as the lack of optical barriers separating a specific space from another one.

<sup>23</sup> An important aspect is also the creation of ecological corridors, coherent and continuous greenery systems, with consideration for biodiversity.



**Figure 5.** a)– Four lanes under the ArenaA stadium in Amsterdam<sup>24</sup>. b) – Fragment of the road branching going through a building in Osaka, Japan.<sup>25</sup>

### 5. Problem of traffic junctions and hubs

Norwegian researchers in their studies have demonstrated that densification of workplaces and places of residence near public transport hubs reduces car traffic per one resident, as well as per one worker. These studies demonstrate that cooperation of the transport function, i.e. transfer centres of public transport and commercial areas reduces the need to use the car. The least car traffic in Norwegian cities is generated by residents of inner cities. This means that cities which plan to minimise car traffic and emissions should locate new residences and workplaces in the direct vicinity of the city centre or near transport hubs. It is a thesis contained in conclusions of the report of Aut Tennøy from the Institute of Transport Economics in Norway, devoted to possible transformations in Bergen, Kristiansand, and Oslo.<sup>26</sup> Co-location of residential premises and services increases the number of pedestrians and cyclists.

In this respect centres of contemporary cities should constitute a more consolidated structure, resembling modern shopping centres. It is worth pointing out that these are exclusively pedestrian areas with a lot of illumination, covered, with very friendly flooring and greenery growing all year long. The effect, which has become already firmly established, is that they are more willingly visited than city centres. Their strength is also the vicinity and number of car parks located in their direct proximity. In the city such solutions are possible only in the case of multi-level construction of transport systems.

Hubs in structural grids have their hierarchical and meaning-related levels, they can also be called activity foci. In the network of urban relations a very important function is played by intermediary foci.<sup>27</sup> Taking location-related factors into consideration, we can speak of hubs at the level of a specific area or city district, the level of the city, and the level of the region. They are incorporated in the nodes of the settlement network of the local, urban, or regional level as exchange zones. Nevertheless, even in the case of regional nodes, cooperation at the level of their closest, local surroundings is also of key importance. Hence the location of important and strategic landmarks in the city should take into account the revitalisation of areas located in the nearest spatial quarters.

<sup>24</sup> Photo: [http://farm4.static.flickr.com/3223/4088632271\\_9f8e66da77\\_o.jpg](http://farm4.static.flickr.com/3223/4088632271_9f8e66da77_o.jpg)

<sup>25</sup> [http://i.dailymail.co.uk/i/pix/2012/01/30/article-0-118548C3000005DC-337\\_964x613.jpg](http://i.dailymail.co.uk/i/pix/2012/01/30/article-0-118548C3000005DC-337_964x613.jpg)

<sup>26</sup> Aud Tennøy, Frants Gundersen, Oddrun Helen Hagen, Marianne Knapkog, and Tanu Priya Uteng. Effect of densification in hubs in Bergen, Kristiansand, and Oslo on traffic and emissions. TØI Report, 1575/2017.

<sup>27</sup> Execution of even the smallest passenger transfer hubs without proper functional infrastructure makes no sense.

Hubs should combine at least two realities; they should be places where services fulfilling different functions complete each other, for example trade with administration, trade with healthcare services, trade with entertainment, trade with business. This principle governs most shopping centres, the so-called galleries, and that is why they are such a strong competition for inner cities and city centres. A similar function is fulfilled by contemporary passenger transfer hubs. They become the dominating transport hubs in Silesia. This principle is followed by reconstructions of railway stations in Gliwice, Sosnowiec, and Katowice. Transport multimodality should be accompanied by spatial multifunctionality. The function of integration of individual services and elements will constitute an added value here. The manner and type of cooperation of individual components will have their effect on the efficiency of the entire system and on the economic effectiveness of the project. The more and more common integrated transport hubs described herein are usually located near important railway stations and are functionally linked with other means of public transport, and most of all with different types of services. In terms of composition, they are urban spaces exhibiting a characteristic spatial form, which results from the belief that the main passenger transfer node can simultaneously be the most effective location for a strong and dynamic concentration of commercial functions. According to Zbigniew Zuziak the archetypes of megastructures with an integrated transport function are – among others: Grand Central Terminal in New York, erected in 1903-1913, Penn Center and Market Street East in Philadelphia, Municipal Terminal in Stockholm, the so-called Vasaterminalen (the Vasa Terminal), and Euralille Center in France.<sup>28</sup> Availability of individual functions in such structures should be subordinated to the principle of the ‘accessibility tree’.

## 6. Conclusions

Synergy undoubtedly is a special form of coexistence, characterised by harmonisation of individual interrelations. From the perspective of the history of urban planning, it is worth pointing out that to a certain extent the phenomenon of spatial correlation taking the form of synergy is decisive for the sense and point of urbanity.

In the functional dimension it is about individual entities complementing each other and a balance between individual functions, which results directly from the balance of objectives and priorities of the spatial policy and strategy. So as to avoid negative effects of synergy, the so-called Ringelmann effect, it is necessary to assign a specific form of responsibility for space to individual entities. As the number of entities responsible for a specific area grows, the time necessary for the proper and optimal cooperation of engaged entities gets often reduced. In economic terms, it is referred to as the team effectiveness, leading to the optimisation of solutions.<sup>29</sup> The practice of obtaining the effect of synergy should be based on the rationalisation of activities. Building of a greater value can be accompanied by the reduction of financial outlays and saving time.

The principle of energy and space saving leads to searching for synergic solutions in this respect, as well. There is no doubt that multi-level solutions to a certain extent allow to create new road connections, reducing their negative effect on the existing urban tissue and the life of the city. It is also very probable that a multi-level city is a contemporary antidote to building towers and other tall structures in city centres. Structures built above streets can intensify inner cities without the need to build excessively tall buildings, maintaining the man-friendly scale of the urban tissue. Most probably in the near future multi-level construction will quite soon address new investment needs in already strongly urbanised areas. Today more and more often multi-level apartments have green gardens on the roofs. All we need is appropriate legal and spatial solutions allowing to create systems of continuous public spaces, located e.g. on the second-floor level in city centres. A pedestrian system

<sup>28</sup> Zuziak Z.K., *Strategie rewitalizacji przestrzeni śródmiejskiej*, Monograph; 236, Publishing House of the Cracow University of Technology, Cracow, 1998.

<sup>29</sup> Martyniak Z., *Wstęp do inwentyki* (2<sup>nd</sup> edition), Publishing House of the Cracow University of Economics, Cracow 1997, p. 47.



deprived of spatial barriers in the city is probably a very interesting solution, from the perspective of the collision of a pedestrian with motor vehicles. This is not about creating narrow lanes, deprived of any services and public spaces, but rather a more comprehensive combination of larger spaces and areas in the third dimension.

New ICT technologies oriented towards faster and more effective process of sharing knowledge are characterised by easy, quick, and expansive building of networks of virtual relations. Looking at the congestion of physical transport routes in the city, it could be stated that physicality is still behind the intellectual, spiritual, or virtual reality. Obviously, investments in roads, motorways, railway lines in the material, physical, urbanised world is extremely expensive; nevertheless, transferring experiences from the hardware world, perhaps it is necessary to build a new level of 'traffic buses and lines' to relieve the old system. In the world of computers it takes place at a different level. Perhaps in the city, too, we should pursue multi-level solutions more willingly. Contemporary examples of such structures demonstrate that such solutions are not only economically and spatial effective, but additionally they are functional and interesting in formal terms.

## References

- [1] Blazy R., "Planowanie społeczno-ekonomiczne, a planowanie przestrzenne (na przykładach angielskich)", [in:] *Skuteczność planów zagospodarowania przestrzennego. Potrzeby i możliwości*, ed. E. Węclawowicz-Bilska, Z. Zuziak, Publishing House of the Cracow University of Technology, Cracow 2004, pp. 70-74.
- [2] Blazy R., "Specific problems of post-industrial sites revitalisation in the Silesian agglomeration", [in:] *Mobex 2013-2014 – Water and City – Brownfields*, Society of Slovaks in Poland, Bratislava–Budapest–Cracow–Ostrava 2014, pp. 74-82
- [3] Blazy R., "Aktywność społeczna jako najważniejsza treść rewitalizacji miasta, artykuł" [in:] *Projektowanie rewitalizacji miast*, Czasopismo Techniczne, z. 3-A, Publishing House of the Cracow University of Technology, Cracow, 2012, pp.173-180.
- [4] Blazy R., *Wartości humanistyczne jako kod genetyczny miasta*, (text in Polish with abstracts in English and French), MONOGRAPH No. 497, Series Architecture, Publishing House of the Cracow University of Technology, Cracow, 2015.
- [5] Böhm A., *O budowie i synergii wewnątrz urbanistycznych*, Monograph No. 6, Publishing House of the Cracow University of Technology, Cracow, 1981.
- [6] Czarnecki W., *Planowanie miast i osiedli*. Volume 1, PWN, Warsaw 1960.
- [7] Derlatka A., "Synergia jako kryterium oceny projektów rewitalizacji śródmieść", *Budownictwo i Architektura* 16(1) (2017), pp. 19-28.
- [8] Gądek Z., "Kształtowanie wieloużytkowych obiektów architektonicznych". Publishing House of the Cracow University of Technology, Cracow, Zeszyt Naukowy No. 1, Cracow 1971.
- [9] Nowakowski M., *Komunikacja, a kształtowanie centrum miasta*, Arkady, Warsaw 1976.
- [10] Zakrzewska-Półtorak A., "Znaczenie bliskości dla występowania efektu synergii w powiązaniach funkcjonalnych jednostek przestrzennych", (in:) *Przestrzeń w nowych realiach gospodarczych*, ed. Korenik S., Hajduga P., Rogowska M., Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, Research Papers of Wrocław University Of Economics No. 408 • 2015, *Przestrzeń w nowych realiach gospodarczych* ISSN 1899-3192.
- [11] Zuziak Z.K., "O synergii planu w urbanistyce", *Budownictwo i Architektura* 16(1) (2017) pp.183-198.
- [12] Zuziak Z.K., *Strategie rewitalizacji przestrzeni śródmiejskiej*, Monograph; 236, Publishing House of the Cracow University of Technology, Cracow, 1998.