

A linear city development under contemporary determinants

Abstract

The Linear City concept in spatial planning has been present since Soria y Mata's proposal in 1882 (Collins, 1959). Yet, naturally conditioned elongated urban developments have not been a frequent subject of research. However, dynamic urbanization under ongoing processes of globalization have brought new conditions and challenges for cities, among them a strong impact of international financial markets on a city space. Cultural and recreational areas are being systematically replaced by commercial and office buildings what disrupts correct city structure. The set of conditions mentioned above relate to linear cities as well.

Apart from analyzing possible causes of developing existing linear cities, this paper aims to examine their contemporary development possibilities determined by mentioned above factors. Sarajevo, BiH serves as case example. On the basis of extensive literature review the development possibilities have been recognized. In case of Sarajevo possible interventions appear as strengthening main transportation axes and establishing new centers along the city spine¹.

Keywords: Linear city, urban development, contemporary determinants of city development

1. The concept of linear development

There have been many different stances on why or how the linear development concept emerged in urban planning theory. Some argue that the early 1920s city formation principles were based on solving ecological city problems, emphasizing importance of close connection with natural environment and walkability between main city elements, thus moving away from the centered concept.² Others would argue that the early linear concept was a fordist concept inspired by repetition, mass production and traffic connections. Another common reason for advocating linearity in city formation, urban design and urban intervention is a response to the vertical growth of buildings and congestion. However it needs to be noted that the idea of linearity is one that in urban theory occurs in various forms, schemes and approaches, yet emerges continuously throughout the last century whether inspired by predecessors or not.

The linear concept appeared in theory of urban planning by the end of the 19th century. The pioneer who first envisioned, proposed and actively promoted this new scheme of city development was A. Soria y Mata with his plan for Ciudad Lineal de Madrid in 1882. The idea of linearity was expressed by emphasizing main transportation route as backbone of the proposed urban layout. All other functions were arranged along that axis with defined width and indefinite length, intersected at certain intervals by secondary perpendicular streets. The layout consisted of large blocks with residential buildings surrounded by vegetation with commercial and public structures situated at intersections. (il. 1) Soria y Mata believed that this type of development would eliminate many social problems caused by urban congestion.³ He managed to fund, realize and develop his idea of

Ciudad Lineal as a settlement in close vicinity of Madrid (today it is a district of the city).

The linear concept has been often compared to E. Howard's widely accepted and applied Garden Cities. Although linear concept occurred first, both share many similarities such as intermingling of rural and urban life, confronting malignities of city congestion, connection to the natural environment and pedestrian connectivity. A major enthusiast and promoter of the linear city concept, Georges Benoit-Levy brought the idea into international focus and thought of the linear city as one of two types of garden cities.⁴

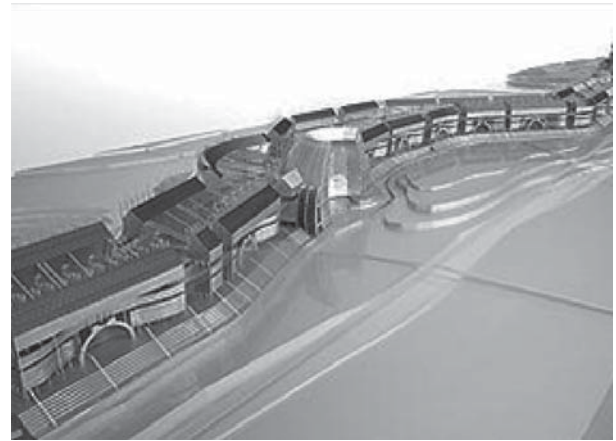
In the 1930s soviet urban planner N. A. Milyutin implemented linear schemes of development on grounds of Magnitogorsk and Stalingrad. His theory was based on rigid order of parallel strips as follows: 1) railway 2) industrial zone 3) buffer zone of vegetation 4) highway 5) residential zone with schools and public buildings 6) recreational park in front of the river. (il. 2) Even Le Corbusier expressed great interest in the linear urban development. His several plans for Algiers called Plan Obus (French for "cannon shell") and plans for Rio de Janeiro in 1930s, comprised of a multikilometer continuous megastructure with housing beneath elevated highway, a so called building-aqueduct-highway typology. Other notable examples of the linear concept project and proposals are K. Tange with his Tokyo

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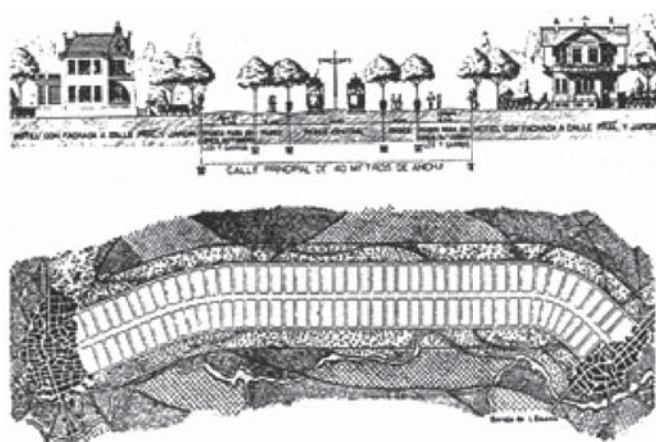
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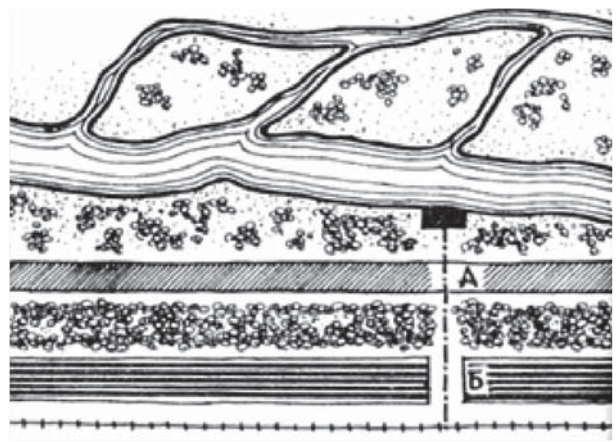
il. 1. Ciudad Lineal de Madrid by Soria y Mata



il. 2. Milyutin's scheme of a linear city



il. 3. K. Tange's Tokyo Bay project



il. 4. P. Soleri's Lean Linear City

Bay megastructure in 1960 (il. 3), M.Graves and P. Eisenman's Jersey Corridor project in 1965 and The Lean Linear City by P. Soleri in 2012. (il. 4)

While architecture historian G. R. Collins, who collected an abundant amount of literature concerning linear city development and wrote a great number of them himself, thought of it as a naturally driven pattern of city growth, he did not clearly separate the concept of linear city planning from larger scale linear development.

According to Collins the first serious discussion on topic of linear development came from Ch. Bouilhet in 1912 who supported the idea of such an arrangement for cities that already exist on transportation routes or rivers but expressed concern that in general the linear plan would lead to "*disappearance of cities as nuclei of human activity.*"⁵

One of the most prominent critics of linear city development was urban planner C. A. Doxiadis who coined the word Ekistics, meaning science of human settlements. He claims that a linear city is unfeasible.

"...because the surface of the earth is three-dimensional, the creation and function of a linear city is impossible. Any connection with functions not situated along the axis of this city would disrupt its uniformity and linearity."⁵

Doxiadis is very firm about his stance that the linear concept can only exist as part of a city, a settlement, but not a city as a whole. Contrary, his idea of development is expressed through *Dynopolis*, a city formation determined by dynamic forces.

Nevertheless the urban plan of Islamabad designed by Doxiadis Associates in 1960 and Rio de Janeiro in 1965 express dominant linearity. A R. Llewelyn-Davies notes "...the *Dynopolis* does imply the control of expansion along a single axis."⁶

Essentially, in history of urban planning the linear concept of city development has been quite argued about internationally and a lot of ink has been spilled about it in publications. Many urban planners and architects found linearity as proper solution, yet interestingly there are not too many actually accomplished and developed precedents of such development. A lot of them found and emphasized values of the linear arrangement yet in the end still favored concentric city development.

The reason can be identified in a lack of clear distinction of linear development on different scale levels. Therefore, in level of regional planning we are talking about the agglomeration of corridor development which needs to be distinguished from linear urban planning of city level jurisdiction. This lack of clear definition and visualization on different scale levels leaves room for misunderstanding and confusion which inevitably results in failure to achieve realization. Such a case occurred in the Netherlands in 1990's when planned-corridor-development seemed to become leading concept in spatial planning, yet often misleadingly confused with linear city concept, vanished completely from the final spatial plan.

Another distinction to be underlined are existing linearly evolved urban structures in comparison to from-the-ground-up planned linear urban formations. Cities that emerged in a dominantly linear direction along rivers, sea coasts, transportation arteries, in valleys or any other topographically defined boundary which conditioned their linear development, have different potentials in extensions or interventions in further urban and regional planning than cities that were initially planned linearly. Categorizing types of linear development and defining their differences/similarities is ground for further research.

2. Determinants of contemporary city development

There is a combination of factors that stimulate cities' successful growth and the others, that hamper development. In the era of globalization it is to be assumed that factors mentioned above influence the urban structures all over the world but local circumstances modify their strength and create unique combinations. The factors that must be taken into consideration are six types of the environment: economic, political, natural and urban, technological, social and cultural, demographic.⁷

It is worth emphasizing that broadly understood **economic conditions** have significant influence on the development of each company, also a developer one. High GNP level and low unemployment favour the development of developer companies and the demand for new residential and office buildings and shopping malls. Favourable loan policy for individual customers and business subjects may stimulate the investment in cities. It also has considerable influence on the final price of the property. Loan conditions remain closely related to the level of the rates of interest, level of inflation and the size of other macroeconomic indices.

Economic environment has its regional context. A developer company operating in an expansive city has a greater chance of development and growth than a similar company in a backward and stagnant region. Regardless of the level of the indices discussed above, the analysis of economic environment has to take into account the results of experts' reports and forecasts made by the institutions monitoring and comparing the development of selected countries in all aspects. These results have considerable informative value and at the same time they create the image of a country and city. This image is reflected in the readiness to make investments.

Political environment comprises: legal system, government institutions and ginger groups. Political tendencies have

strong influence on the subjects operating on the market. Legislature defines the rules of functioning of business subjects and the conditions of cities' development.

Master plans modify the map of available building space in cities and seriously limit the supply of such areas. Areas whose status remains unclear and create a high risk for investors. Master plan thus may create some difficulties for the investors. Building areas available on the market often require investment and additional examination, more difficult conditions raise the cost of design and of the whole investment. The Master plan procedures as well as the building law requirements may modify the investment procedures.

The most broadly understood trends in **natural environment** are directly connected with technological environment. Limited natural resources, environment pollution and increasing cost of energy influence the directions of technological development in all domains.

In a country natural environment constitutes climatic and ground conditions connected with the relief, which are important for investments. They considerably influences the structure of each building.

Urban environment also comprises the set of spatial and functional relationships of a given area, its communication network and settlement structure. Architectural environment, however, determines to a large extent the suggested functional and aesthetic solutions. The relationships between the object being built and its surroundings create a new quality through the newly shaped context. This new quality in the space affects both the standard of lodging and the way in which the objects fulfil their functions. Lack of communication and infrastructure facilities also may create problems and barriers for the city.

The most difficult areas to develop are historical centres of large and medium-size cities, urban and suburban areas with prestigious character, connected with groups of monuments and valuable open space areas where meeting of conservatory requirements is difficult and expensive.

Technological environment has been changing dynamically for the last few decades. In the recent years we have witnessed spectacular changes connected with the development of IT technologies. They influence not only particular branches of economy, but also the life of an average citizen. They change the lifestyle and enable the implementation of new working methods; they broaden the oppor-

tunities to obtain information and to communicate with all world. In such conditions consumption models spread faster than they used to a few decades ago and they affect people much stronger. Technologies connected with building also develop rapidly. It has to be emphasized that technological development in the field of building and construction proceeds unevenly.

Social and culture environment comprises the total of the phenomena taking place in the world, country, city and neighbourhood. The factors that have their source in facts, events, emotions connected with the global community create the atmosphere that results in similar attitudes and behaviours in particular countries of towns, although they definitely have their local specific features. They apply to individuals, families, workplaces, environments and social groups alike. The global sources of threat that are easiest to recognize are limited resources of earth gas and oil, world terrorism and natural environment pollution, which threatens human health. In the social environment of a developer company there are clear pro-ecological attitudes, strife to save energy, limiting the cost of exploitation of houses and apartments as well as the need to guarantee the safety of materials and technologies used while building the houses. The level of acceptance for alternative energy sources increases out of necessity (e.g. solar energy). We can also observe the attempt to become at least partly independent of external energy sources. B2B relationships quality also influence the investment process.

Cultural environment sets out trends for consumption, aesthetic norms and it affects the fashion and brief fascinations. It increases sensitivity to aesthetic stimuli and its native output mingles with the achievements of foreign creators. It also determines the lifestyle and customs. Main cultural values that are valid in a given society influence the people's perception: of themselves, of others, of the natural environment, of institutions and of the world as a whole.⁸

In the global scale in the last few decades there has been a **demographic explosion**. Rich societies, contrary to global tendency, are becoming older quite fast. Demographic tendencies especially in most of European countries are not favourable from the point of view of economic development of the country what is affecting also the city development. These factors are among the most important conditions determining the residential market growth.

For the last few years the number of citizens over 65 has been increasing – by more than several dozen thousands each year. The ratio of people of pre-working age to those of post-working age is deteriorating. The number of people of post-working age is increasing and the number of those in pre-working age is decreasing with regard to the people who are professionally active. It means that the society, where fewer and fewer people are working, must shoulder the responsibility for the support of an increasing group of pensioners.

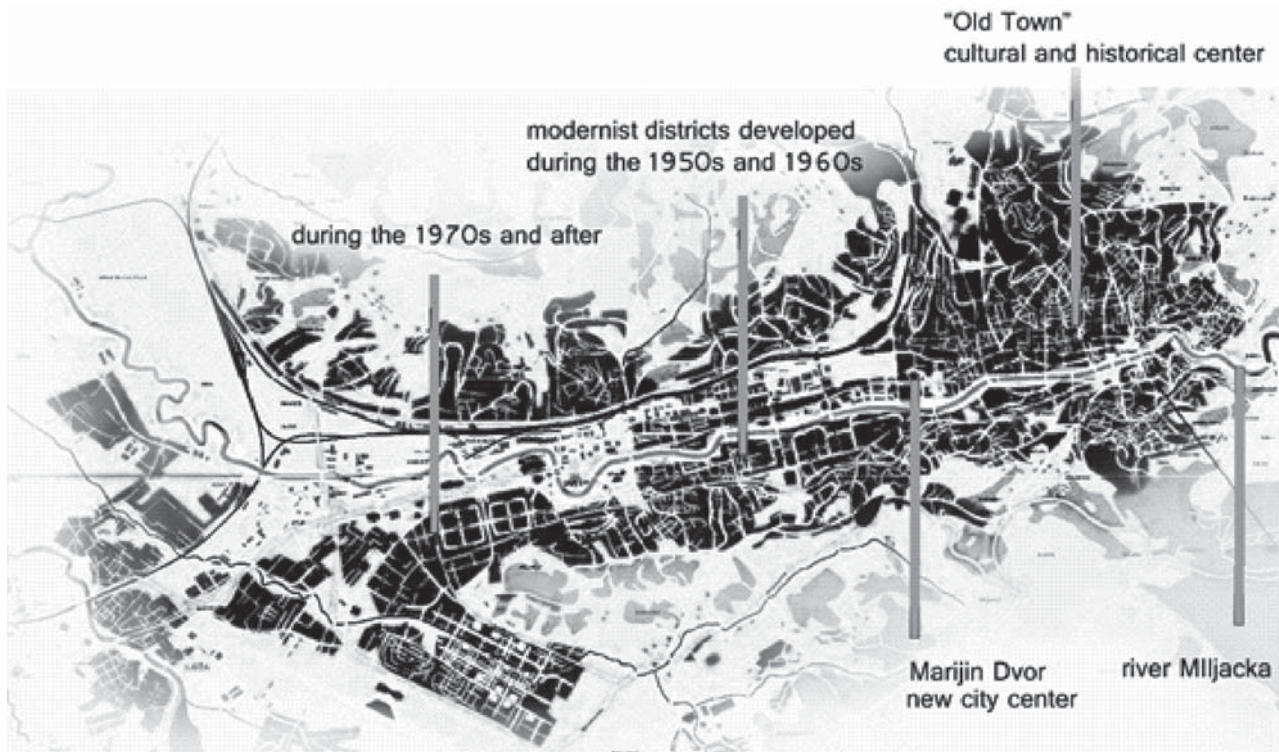
3. Sarajevo – a linear city

Sarajevo is a city whose elongated form is a naturally conditioned one. The urban area lays in a valley situated around 500 m above sea level, surrounded by hills and Dinaric Moun-

tains (lowest being 1,453 m high), while river Miljacka passes through and splits the valley longitudinally. With all these natural barriers, the valley only gets to spread towards West. Such a distinctive topography is a major factor influencing climate, transport, urbanism and socio-economic conditions. In contrary to the naturally assigned continuous spatial expansion, there is a lack of consistency in town planning policy. This is due to a turbulent history of frequent alternations of regimes which conditioned social, cultural, urban and economic consequences. Each period left physical traces along the valley in an almost chronological order from East to West.⁹ A brief introduction to historical conditions of the city's development is necessary to underline that Sarajevo's linearity was not a product of urban planning. Which makes it even more peculiar in analyzing the city as a linear developed one.

Sarajevo originated in the narrowest end of the valley in the East in the 15th century during the Ottoman rule. This area today represents the cultural and historical center of the city. Its urban fabric is mainly defined by a human scale of proportion and a clear distinction in zoning of residential parts apart from the central area with commercial, educational and public facilities. The residential area is spread along the hillside amphitheatrically following an unwritten rule of respecting the "right to a view" of neighbors towards the center, called *Bascarsija*.¹⁰

Further West the valley spreads moderately and leads towards the new city center, called Marijin Dvor, which by the end of the 19th century formed the outskirts of the city. The zone from Bascarija to Marijin Dvor strongly developed during the Austro-Hungarian period. This was a very fruitful time in Sarajevo's construction and development, producing also the first city regulation plan. In contrary to the Ottoman patchwork, Austro-Hungarian planning consisted of blocks of multistory buildings designed in Neo Renaissance, Neo Classicism, Art Nouveau and Eclecticism styles, intermingling residential with other functions. Followed by two World Wars and an Interbellum period of stagnation, Bosnia and Herzegovina became part of FR of Yugoslavia. Sarajevo's urban layout in the 1950's and 1960's was strongly influenced by Corbusian modernism producing settlements of plain volume buildings, spread in repetitive patterns, favoring social housing over individual. This continued along the valley in chronological



il 5. Map showing the cities linear expansion and complementary historical development

order. In the 1980's finally the city reached its construction boom as response to the Winter Olympic Games it hosted. Urban layouts became more geometric in form, showcasing high-rise buildings with seemingly more landscape design. Nevertheless, actual planned development occurred mainly in flatland areas of the valley while the hills were mostly occupied by individual housing, often illegally constructed and without proper planning. Succeeding is a period of great destruction during the 1992–1995 war. Contemporary Sarajevo is experiencing a neo-liberal policy. Official urban and regulation plans are often subject to changes, lacking reasonable argumentation and in favor of free-market economy, privatization and foreign capital inflows. It has become a very common sight to observe new edifices imposing gentrified locations and prioritizing commercial and/or apartment buildings of low-quality-level living conditions. Actual planning does not occur in necessary scale, but rather as interpolation of interests into the existing urban fabric.

4. Conclusions

Linear development theory comprises of different scale-level examples, variations of schemes, agglomerations, visions and realizations, yet most of them fall into the category of linearly planned. The case of Sarajevo on the other hand is a naturally formed linear example, which has not yet been a frequent subject of research. Common characteristics in approach and goals of linear planning can be established, but the question arises whether and to what extent they can be implemented into an existing linear urban fabric. Such spatial interventions are subject to further, more extensive research. Though this paper aims to produce guidelines for their formulation. Doxiadis firmly states: "As long as we have forces in all directions of the surface of the earth we **cannot** have linear cities." Yet he also stresses: "The previous statement allows for two cases of linear settlements. In locations where our forces are

not pointed in all directions, in a valley or on an island..."¹¹

Certainly Sarajevo falls into the category of Doxiadis' exceptions thus **can** be considered a linear city, until the point the valley spreads (which is still most of the city area).

This clarification gives us reason to pursuit the potentials of the linear development concept in order to produce feasible, sustainable and viable urban conditions for existing linear cities such as Sarajevo in accordance with determinants of contemporary city development.

In case of Sarajevo possible interventions appear as strengthening main transportation axes and establishing new centers along the city spine.¹³ Complementary to this are statements of Doxiadis in regards to intersection of the main artery. Creating such a polycentric environment and multiplying important functions in these "nodes", would decrease the need for car usage, thus unburden the traffic congestion of the main axis, stimulate walkability and decrease pollution to some extent, establish a motion pattern to guide future demographic and urban extension while providing a favorable cultural environment.

In conclusion, some common guidelines for interventions in linear urban structures can be formulated as follows:

- I. Linearity creates additional challenges that affect city urban development. Their identification allows to consciously transform the city structure and improve its quality.
- II. Linearity invites to multiply communication nodes and diversify public spaces. Some



II. 6. A schematic polycentric proposal of Sarajevo's linear development (Source: coauthor T. Tufek-Memisevic own study)

needful investments improving the city public space might be technically complicated and very expensive (for example multilevel intersections).

III. In the urban planning process of the linear city special attention must be paid to the axes perpendicular to the main one which may strengthen the significance of a given area.

IV. Market conditions may disrupt linear city urban development because good investment conditions not necessarily appear in the areas that should be developed within the linear structure.

ENDNOTES:

- ¹ Stachura E., Tufek-Memisevic T., Sokolowska-Moskwiak J., "Urban and Architectural Design Problems in the Contemporary city: The Case of Sarajevo", in *Architecture, Civil Engineering, Environment, Silesian University of Technology Gliwice 2015 Vol. 8 No. 1*
- ² Krasilnikova, E., "Landscape and urban planning transformation of space-planning structure", *The Hybrid Link, Urban Hybridization, 2014, Vol 3*
- ³ Collins, G. R., "The Ciudad Lineal of Madrid", *Journal of the Society of Architectural Historians, May 1959, Vol. 18, No. 2*
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- ⁶ Doxiadis, C. A., "On Linear Cities", *The Town Planning Review, April 1967, Vol. 38 No. 1 pp. 35-42*
- ⁷ Llewelyn-Davies R., "Some Further Thoughts on Linear Cities," *The Town Planning Review, Oct., 1967, Vol. 38, No. 3*
- ⁸ Stachura E., *Polish Housing Architecture in the process of transformation – macro-environment and competitive factors*, in: *Architecture, Civil Engineering, Environment, Vol. 1 No. 2/2008, The Silesian University of Technology, pp. 13-22.*
- ⁹ Stachura E. *Determinanty zmian w architekturze mieszkaniowej okresu transformacji w Polsce*, Wydawnictwo politechniki Śląskiej, Gliwice 2009, ISBN 978-83-7335-584-2.
- ¹⁰ Tufek-Memisevic T., "Architecture of Consumption. Case study Sarajevo", *Konsumpcja i Rozwój, Institute for Market, Consumption and Business Cycle Research, Warsaw 2014, Vol.8, No. 3*
- ¹¹ Grabrijan, D., & Neidhardt, J., "Arhitektura Bosne i put u suvremeno: Architecture of Bosnia and the way modernity", *Državna založba Slovenije, Ljubljana, 1957*
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- Figure 5: Source: coauthor T. Tufek-Memisevic own study
- Figure 6: Source: coauthor T. Tufek-Memisevic own study