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MULTI-MODAL TRANSPORTATION HUBS AS THE ELEMENTS OF A POLICENTRIC SYSTEM OF THE GREATER CITY CENTRE FORMATION (by example of Lviv city)

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Abstract. The current state of multi-modal transportation hubs construction as the key elements of the city's transport network, problems and tendencies of the architectural and planning organization of urban development in the zones of their influence are analyzed. The complex of issues of urban development of functional-planning and architectural-spatial reorganization of the territory and building around these nodes as elements of the formation of the polycentric system of the city center is considered. Conclusions and recommendations on the given problems are presented.

Key words: city public centre, polycentric system of the city centre, multi-modal transportation hub.

1. Introduction

The city public centre belongs to the very complicated architectural, urban, social and spatial phenomena. Its environment, formed by the main public buildings and architectural ensembles, institutions and departments of city services, is the centre of concentration of the most important types of activity and public life for the city. The city public centre, located in the central planning area, more than other elements of the city structure provides continuity of its development. On the one hand, the territorial development of the city determines the functional and spatial structure and size of the centre, and, on the other hand, the active transformation of the centre significantly affects the development of the city as a whole. An increase in the urban population and the growth of urban areas is accompanied by the growth of central functions and the transformation of their components and require new organizational and spatial forms. Accordingly, there is the so-called eccentricity (over-saturation) of the city centre, which can be offset by the development of the transport network and the emergence of centres in new areas of development. Today, in many large cities and urban agglomerations, the **polycentric** system of the city public centre is actively formed, in which much of the service functions are transferred from the core to the periphery – in the subcentres outside the central planning area. The city public centre turns into a spatially developed, differentiated system, which covers the most important nodes of the city and forms the structural and functional basis of its compositional and planning structure (Posatskyi B., 1992; Posatskyi B., Korol Y., Mazur T., 1996).

In modern urban planning practice, the creation of a city-centred polycentric system in large cities is considered an important factor in improving their planning organization. Nodes and complexes of the sub-centres drag out the pressure from the core of the city centre, bring service to consumers and make the lives of the city's inhabitants more vibrant and brighter (Posatskyi B., 2001).

The city centre as the main focus of attraction of the population also acts as the main transport hub of the city and urban agglomeration. There is a steady tendency of attraction of public service complexes to areas of optimal transport accessibility and technical infrastructure – units of public passenger transport with railway stations and bus terminals, public transport stops of the city, parking of individual motor vehicles. The main nodes of the transport network and the main complexes of city and district significance are combined spatially in the territory, implementing the principle of public service "on the road". Proceeding from this trend, it is expedient to develop the polycentric system of the city centre and to form its elements on the basis of multi-modal transportation hubs of the city (MTH).

Multi-modal transportation hub is an element of the planning organization of the transport network, in which the transfer of passengers between different types of urban, regional, external and individual transport in different combinations is carried out. Integration of all types of transport into a single spatial complex, realized through one large transshipment, around which the accompanying infrastructure can be formed. In modern urban planning practice, the multi-modal transportation hubs' are designed in two types (Fig. 1). These of the first type are exclusively for transport purposes – multi-level structures combining various transport objects (car and railway stations, platforms of trains, entrances and subways, trams, bus, trolleybus stops, car parking, etc.). The second type covers the hubs, where transport objects are complemented by objects of various types of public services (trade, catering, leisure, recreation zones and other types of public spaces) (Rusanova I., Sklyarova I., 2012). From the planning point of view, the second type of hubs can serve as the basis for the formation of a polycentric system of the city centre and the creation of a spatially and functionally connected urban organism, in which a developed transport infrastructure integrates into the whole one or several city nuclei and sub-centres of different levels.

a b

Fig. 1. Examples of multi-modal transportation hubs of different types:
a – for transport purposes (Tokyo, Japan); b – for transport and public purposes (London, United Kingdom)

2. Basic Theory Part

Due to the high value, density and compactness of the buildings, the potential of the development of the city centre of Lviv (the historical core of the city) is insignificant. Practically there are no spatial reserves of the intensification of its territory by saturation of adjacent streets and quarters with public functions and their inclusion in the structure of the centre. At the same time, with the development of the city, the functional and tourist pressure on the city public centre is constantly increasing. Respectively, the General Plan of Lviv will implement until 2025 the idea of forming a polycentric system based on multi-modal transportation hubs, which reflects the growing importance of the development of transport infrastructure for the successful functioning of well-developed cities at present stage, as well as the role and significance of the city as a powerful transport hub of state and international meaning on the border with the EU (DP DIPM "Mistoproekt", 2009).

In the documents of the master plan of Lviv development until 2025, the transport system of the city is represented by a developed network of transport highways, transport nodes and complex infrastructure, which combines its separate components formed from several types of external transport (rail, road, air) in cooperation with urban public and individual transport for organization of mass passenger and freight transportation. The development of the city's highway network implies the development of the main street network, which is initiated by previous general plans, towards the transformation of the radial system of highways into the radial-ring one, which is most in line with the compact city plan. Priority tasks include at the same time the formation of a large transport ring of main streets of continuous traffic on the border of the historic area of Lviv along the streets of Lypyns'kyi, Yaroshenko, Levandivska, Siayvo, Luhanska, Pasichna, Bogdanivska-Proektovana, Plastova and transport junctions at all their intersections with radial highways (streets Lychakivs'ka, Zelena, Stryis'ka, Horodots'ka, Shevchenko, Khmelnitskoho, and Chornovola Avenue). In zones of transport nodes, it is planned to place large intercepting garages-parking lots in order to restrict the entry of individual vehicles into the central part of the city. It is also planned to create the second mainline semicircle within the peripheral zone of the city from the Sykhiv residential area along the streets of Naukova, Proectovana, Riashivska through the Levandivka, Riasne, Zboyishche districts in the northern part of Lviv to the Khmelnitskoho Street with an access to the highway of state importance Lviv-Kyiv.

The formation of the polycentric structure of the city centre of Lviv with the purpose of unloading its historical centre was also provided by the general plans of previous historical periods. Fig. 3, 4, 5 show their planning models. The project of development of the city centre in accordance with the general plan of Lviv (1946) proposed the creation of its linear-node system: the formation of an “urban composite axis” north-south length of about 3 km (Chornovola, Svobody, Shevchenko Avenues), which began from Petrushevych Square and finished at the beginning of Lypynskogo Street by a large square. The main square behind the Opera House had to become the new public centre of the city, which was connected by the east-west axis with the hill of the High Castle, where it was supposed to set up a statue of Lenin at a height of 50 m. Thus, in the centre of Lviv, the system of communist coordinates “was canonized”.

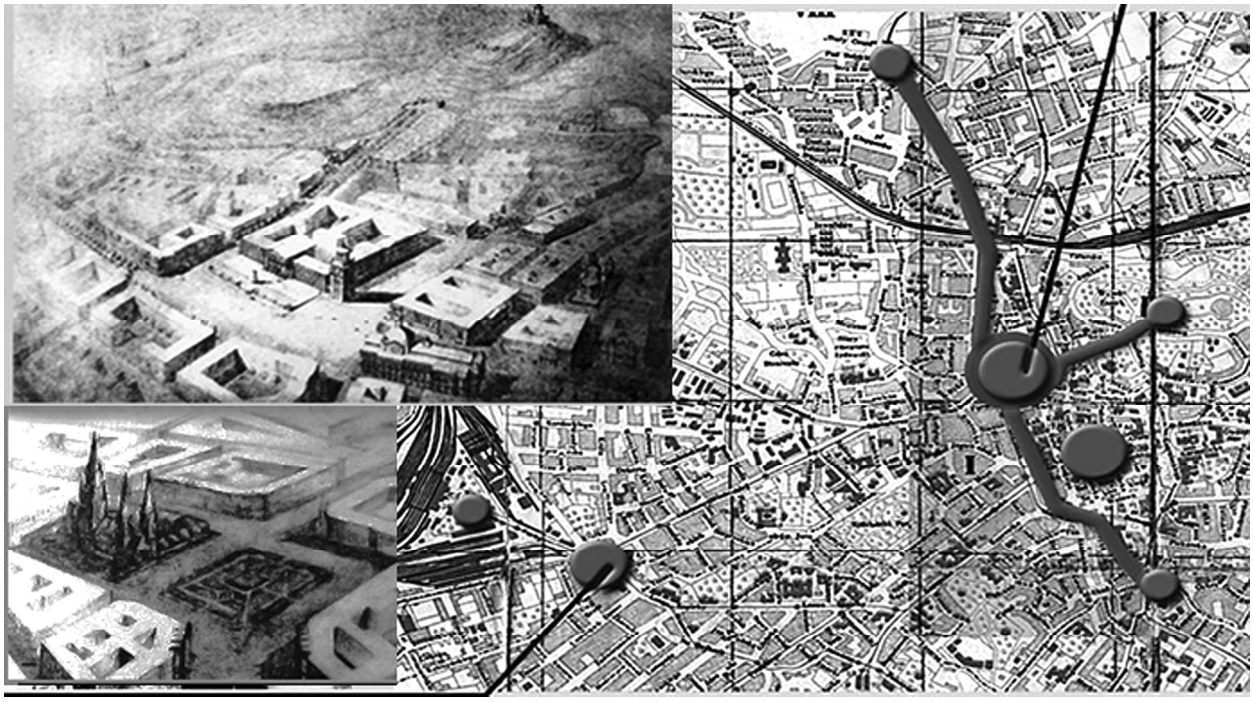

Fig. 3. Project of the development of the city centre of Lviv in accordance with the Master Plan of Lviv, 1946 (authors A. Natalchenko, B. Shvets'ko–Vynets'kyi)

In the general plan of 1966, the polycentric system of the city centre was proposed for the first time, the concept of its linear-nodal development along the Chornovola Avenue was preserved.

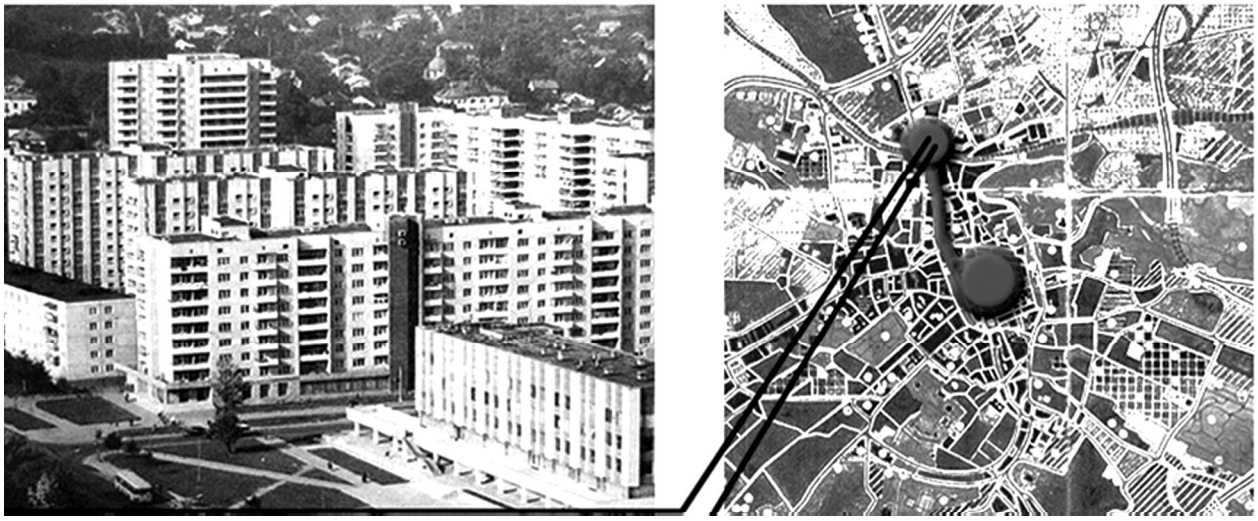

Fig. 4. Project of development of the city centre of Lviv in accordance with the Master Plan of Lviv, 1966 (authors O. Rapoport, M. Yorysh, E. Kutz, E. Doubynskyi, I. Bazarnyk, A. Shulyar)

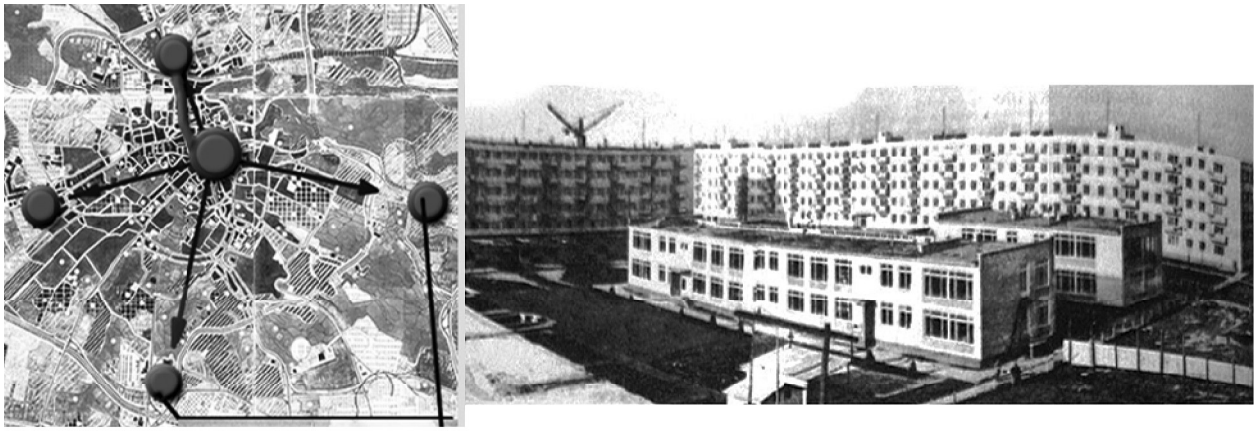

Fig. 5. Project of development of the polycentric system of the city centre of Lviv, 1970 (authors J. Novakivsky, P. Myh, A. Petrova, A. Rudnytskyi)

The project of 1970 develops the idea of forming a polycentric system in the city of Lviv, including new sub-centres: the western one – in the Gorodotska Street near the suburban railway station; the eastern – at the intersection of Lychakivska and Pasichna Streets; the southern – in Stryiska Street next to the Tax Administration building.

Master plan of the city development (1993) and Master plan of Lviv until 2025 continue to embody the idea of forming a polycentric system of the entire city centre, linking it closely with the development of the street-road network and the main transport hubs of the city. It is proposed to create a number of new public sub-centres in connection with the transport infrastructure, including the projected multi-modal transportation hubs – at the intersections of the main streets: Stryjska and Luhanska, Kulparkivska and Luhanska-Proektovana, Kniahyni Olgy and Luhanska-Proektovana, Shevchenka and Levandivska, Khmelnytskogo and Lypynskogo, and others (Fig. 6).

It should be noted that the practical implementation of the declared general plan principles for the development of the polycentric system of the city centre was threatened because of the delay in the implementation of proposals for the development of transport infrastructure of the city – communication paths,

transport junctions and multi-modal transportation hubs. Since the territories around them, as the most attractive from the perspective of promising transport reach, are chaotically developed and built up by objects of public service of various functional purposes. On the one hand, it actualizes the task of finding ways and means for implementing the plans laid down in the general plan for the development of the transport network of the city, and on the other – preservation of surrounding areas to protect against accidental and unpredictable use (V. Shchurova, 2005; T. Mazur and Y. Korol, 2017).

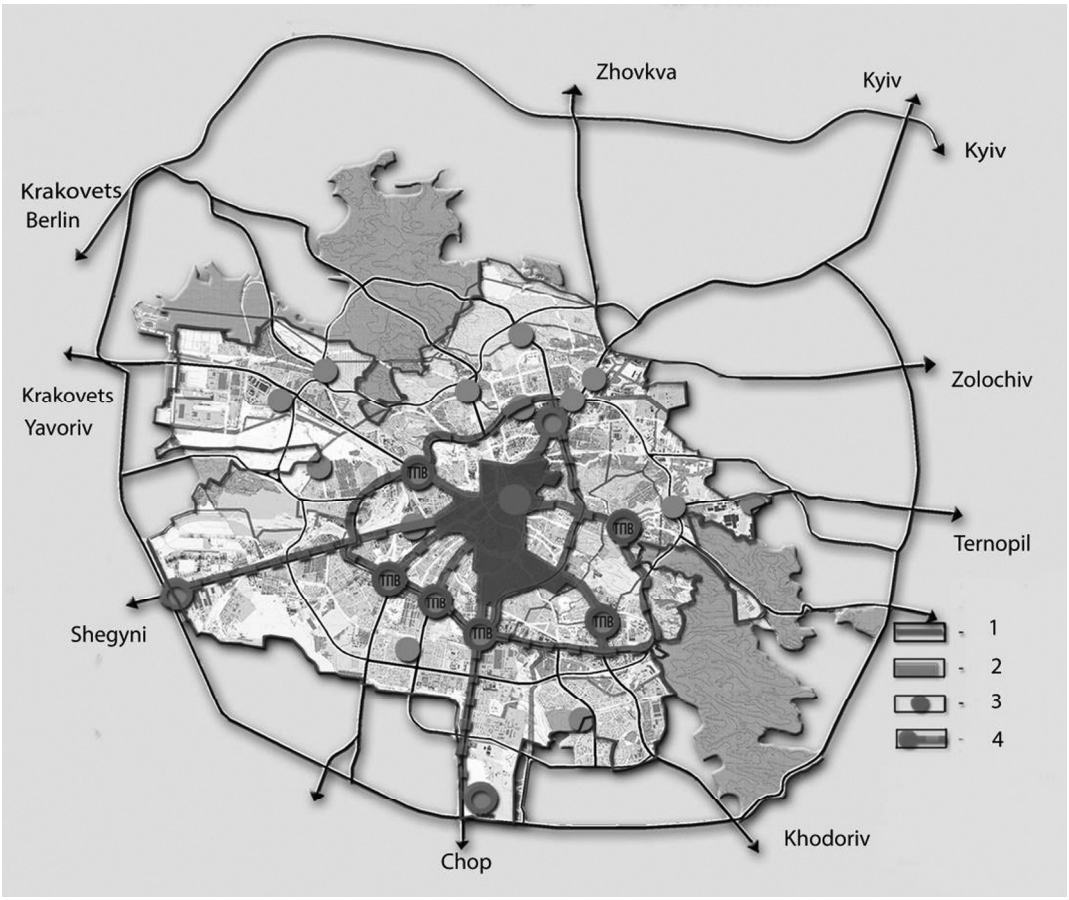

Fig. 6. The proposal of the polycentric system of Lviv city centre development according to the Master plan (2025)
Legend: 1 – planned boundaries of Lviv city; 2 – planned boundaries
of the city-planning system "Great Lviv"; 3 – multi-modal transportation hubs; 4 – city mains

Conclusions

Development of the polycentric system of the city centre should have a complex approach and an organic relationship with the planning structure of the city, the location of transport mainlines and multi-modal transportation hubs, functional zones, landscape and recreational territories. To reach these tasks, the following principles should be followed:

• Principle of optimization of transport and pedestrian connections between elements of the centre and its core, and also with each other by way of development of communications, transport solutions and the whole complex of transport infrastructure of the city;

• Principle of complementarity of system development, namely mutual complement of public service functions in new sub-centres;

• Principle of maximizing the use of existing compositional potential of the architectural environment and natural environment of surrounding territories;

• Principle of phased formation of planning and spatial structure of the polycentric system of the centre, while observing the functional and compositional completeness of its components at each stage of formation.

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**ТРАНСПОРТНО-ПЕРЕСАДКОВІ ВУЗЛИ
ЯК ЕЛЕМЕНТИ ФОРМУВАННЯ ПОЛІЦЕНТРИЧНОЇ СИСТЕМИ
ЗАГАЛЬНОМІСЬКОГО ЦЕНТРУ ЗНАЧНІШОГО МІСТА
(на прикладі м. Львова)**

Анотація. *Проаналізовано сучасний стан будівництва транспортно-пересадкових вузлів як ключових елементів транспортної мережі міста, проблеми та тенденції архітектурно-планувальної організації міської забудови у зонах їхню впливу. Розглянуто комплекс питань містобудівного розвитку функціонально-планувальної та архітектурно-просторової реорганізації території та забудови навколо цих вузлів як елементів формування поліцентричної системи загальноміського центру. Представлено висновки та рекомендації з цієї проблематики.*

Ключові слова: *загальноміський громадський центр, поліцентрична система загальноміського центру, транспортно-пересадковий вузол.*