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## **PROBLEMS OF FUNCTIONING OF THE PEDESTRIAN SPACE IN THE LVIV CITY**

## **PROBLEMY FUNKCJONOWANIA PRZESTRZENI DLA PIESZYCH W MIEŚCIE LWÓW**

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### **ABSTRACT**

The existing state of the pedestrian spaces available in the city of Lviv is analyzed by a combination of two methods: a sociological survey of citizens and a cartographic analysis of the trajectory of pedestrian movement by the city. The article describes the results of respondents' survey concerning the comfort and functionality of the pedestrian spaces of Lviv. The model of organization of the city pedestrian spaces is developed.

Key words: pedestrian space, functioning, sociological survey, cartographic analysis.

### **STRESZCZENIE**

Istniejący stan dostępnych przestrzeni dla pieszych w mieście Lwów jest analizowany za pomocą połączenia dwóch metod: badania socjologicznego mieszkańców miasta i analizy kartograficznej trajektorii ruchu pieszego przez miasto. Artykuł opisuje wyniki badań ankietowych dotyczących komfortu i funkcjonalności przestrzeni dla pieszych we Lwowie. Opracowano model organizacji miejskich przestrzeni dla pieszych.

Słowa kluczowe: przestrzeń dla pieszych, funkcjonowanie, badanie socjologiczne, analiza kartograficzna.

## 1. ANALYSIS OF PRACTICE AND PUBLICATIONS CONCERNING PEDESTRIAN SPACES

The arrangement in the city's areas of recreational territories and pedestrian spaces was the subject of the study of urbanists and sociologists both in the twentieth century and modern ones. The purposeful formation of pedestrian zones began in European cities in the 1960s (Stroget pedestrian street in Copenhagen, Laweis alley in Kaunas, pedestrian zone in the center of Vilnius). For today, after more than five decades, many cities have developed a whole system of pedestrian streets and have become known as pedestrian cities. For example, Copenhagen, Munich, Nuremberg and others.

In Groningen, the Netherlands, the city's choices of where to locate new development areas are intended to reinforce the center city and the city's compact urban structure. Major new development areas, such as Beijum, have been located directly adjacent to already developed areas, and bicycle and pedestrian bridges have been built to provide access to the center. The city has made a strong attempt to locate major public buildings and attractions close in, within the center or within walking distance of it.

Many of European cities have followed a strategy of urban form that allows large blocks of open pedestrian space or green wedges to come very close to urban neighborhoods.



Fig. 1. The city-center of Leiden, the Netherlands, is a mixed-use, highly walkable environment. The city has worked hard to connect its walking streets and urban spaces through, for example, pedestrian and bicycle bridges spanning historic canals, as seen here.

Many German cities have pursued a similar development path. The city of Freiburg, for example, has a development plan that acknowledges and protects five major wedges of open pedestrian space and natural lands. All major areas of urban expansion are accompanied by expansions of the public transit system. The trams do not come along at some possible future date; they are installed contemporaneously with the construction of housing and development. This is a consistent pattern in most European green-urban pedestrian cities [2].

The Danish architect and researcher of the public space - Jan Gehl, focuses in his books on improving the quality of urban space by redirecting urban design to the needs of pedestrians and cyclists [4-6]. He says that in planning of a city architects should pay attention not to architecture and space, but to the needs of people. Only in this case the space will perform its function. According to Gehl, architecture is the interaction between form and life, and not just the form [6].

One of the most important elements for creating a human habitat is the scale - "human scale". All the dimensions in planning of cities of the first half of the 20th century was rather small geared to the pedestrian. Two-storey buildings along the street created conditions for a comfortable stay both at the level of the eyes and for the feet. The space promoted the pedestrian movement. In the modern world there are radically new paradigms of the city. Massive, rapid production, increased scales of buildings completely neglected the scale of a person and crowded out pedestrian movement from the streets. Jan Gehl called this kind of city planning «the proscenium syndrome». He says that the city looks fantastic from the airplane, but inside it is uncomfortable. Therefore, in the past 50 years, the situation of all cities in the world for the pedestrian movement has deteriorated. To solve this, Jan Gehl suggests adhere to and keep in mind the scale of the person - the level of the eye of a pedestrian at a speed of 5 km/h. This axiom, he said, will quickly improve the quality of the urban space of many modern cities [6].

According to German researcher Heiner Monheim, pedestrian zones in the city are great success for the retail function and the attraction of visitors, which increases the growth of the city's economy [8]. Today the design of pedestrian spaces network is one of the conditions for sustainable development of the city. The author defines the principles, which promote the development of pedestrian movement in the cities:

- 1) give the cars their place (to determine the priority of a pedestrian over a car in the structure of the city);
- 2) parking fee;
- 3) public transportation policy (the author emphasizes the well-planned public transport network);
- 4) coexistence/mixed use streets (multifunctional spaces should be in all residential areas, not only in the city center);
- 5) car free housing - pedestrian zones in housing areas - demotorisation strategies;
- 6) bicycle infrastructure (bicycle street is a place where cars drive much more cautiously. Streets with cycling infrastructure are safer for pedestrians and drivers);
- 7) design of space (facade geometry, deep window sills, columns, street trees is key to creating a qualitative space. Uninteresting high-rise buildings will not create the effect of "coherence of the place").

The Riga architect Evelina Ozola confirms, that the high-quality street is a street along which the pedestrian can see the various processes - trade, rest, walks of the citizens and the movement of workers in the offices [9]. This combination of human mobility and social life is optimal in terms of functional organization of pedestrian space. For reclaiming a street pedestrian spaces the author comes up with an attractive and thought-provoking method of prototyping street space and involving the society in the designing process of it.

## 2. HISTORY OF THE DEVELOPMENT OF PEDESTRIAN SPACES IN THE CITY OF LVIV

The pedestrian spaces in the long process of evolutionary development of Lviv have always been an organic component in the city as a whole and today in its historical center. Starting from the boundaries of the city of XIII-XVI centuries, it is possible to speak about the definition of the boundaries of the Lviv historical center (Fig. 1).

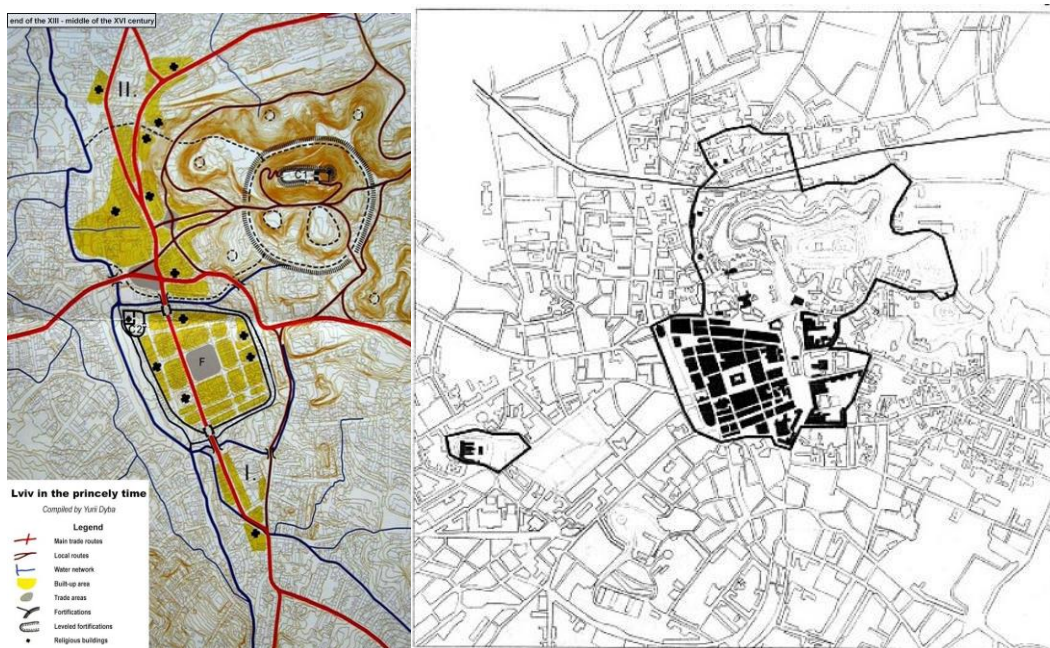


Fig. 2. *Left* - Lviv in the princely time, Atlas of Ukrainian Historical Cities. T. 1: Lviv (2014). Map compiled by Yuri Dyba; *Right* - Nominated Property Location Map, UNESCO World Heritage Centre, 1998.

Taking into account the radical changes in Lviv city development during the 20th century, the present boundaries of the historical center are wider and also cover the urban areas formed in the XVII-XIX centuries (Fig. 2). After the retrieval of Ukraine's independence in 1991, on the one hand, and the decline of large Lviv enterprises, on the other, the sphere of services and trade is rapidly developing in the city. The first floors of the houses in the historical city center began to be used for public function; numerous cafes have taken street space. The unique historical and architectural heritage that compactly located on a relatively small territory, the presence of services on this territory (trade, hotels, public catering, public transport stops) made Lviv attractive to tourists, which greatly increased the amount of pedestrian movement in the historical center.

This made the City Council in the early twenty-first century to restrict to a minimum the traffic on the streets of regularly planned medieval quarters in the historical center around the Rynok Square and turn its territory into a pedestrian free transport zone (Fig. 3).

For today, the territory of the Lviv historical center consists of 120 hectares of the medieval and renaissance part of city and the landscape areas of the park Vysokyi Zamok. The pedestrian spaces there form a network consisting of two clearly defined types of

spaces: a) linear-type spaces (streets); b) the spaces of the node type (squares). The changing of the central historical part into the pedestrian zone was the first step in the development of *pedestrianization* in the city.

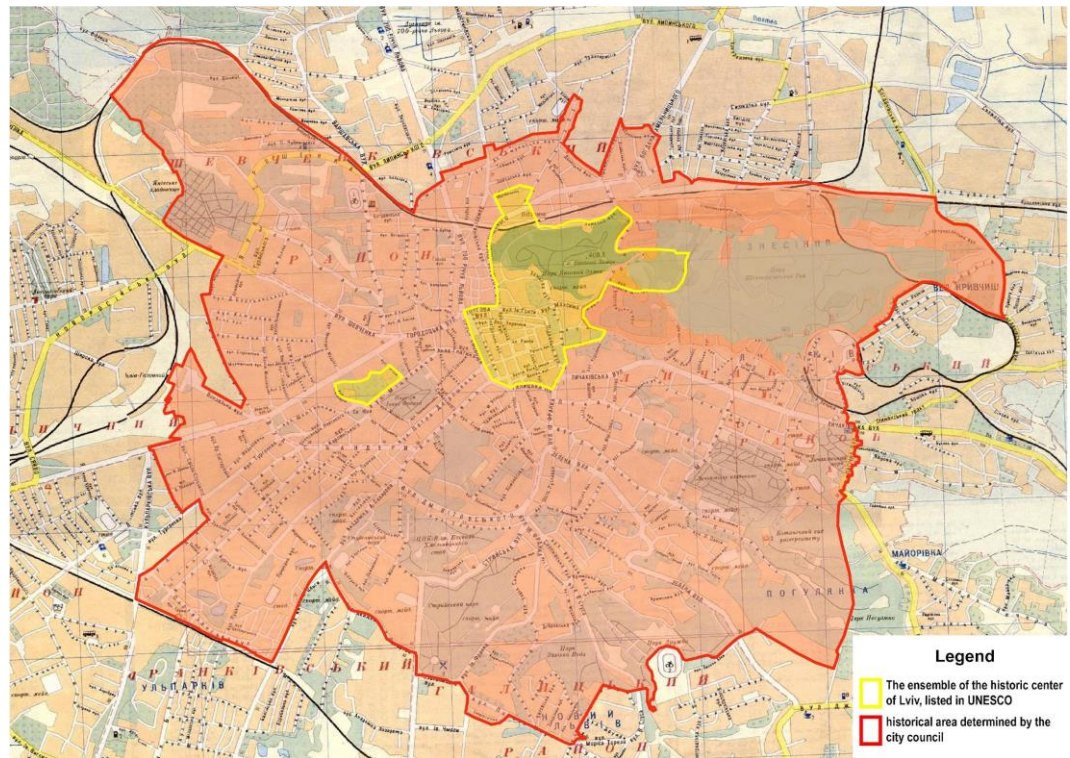


Fig. 3. The boundaries of the historical center and the historical area of Lviv. Lviv City Council. 2005.

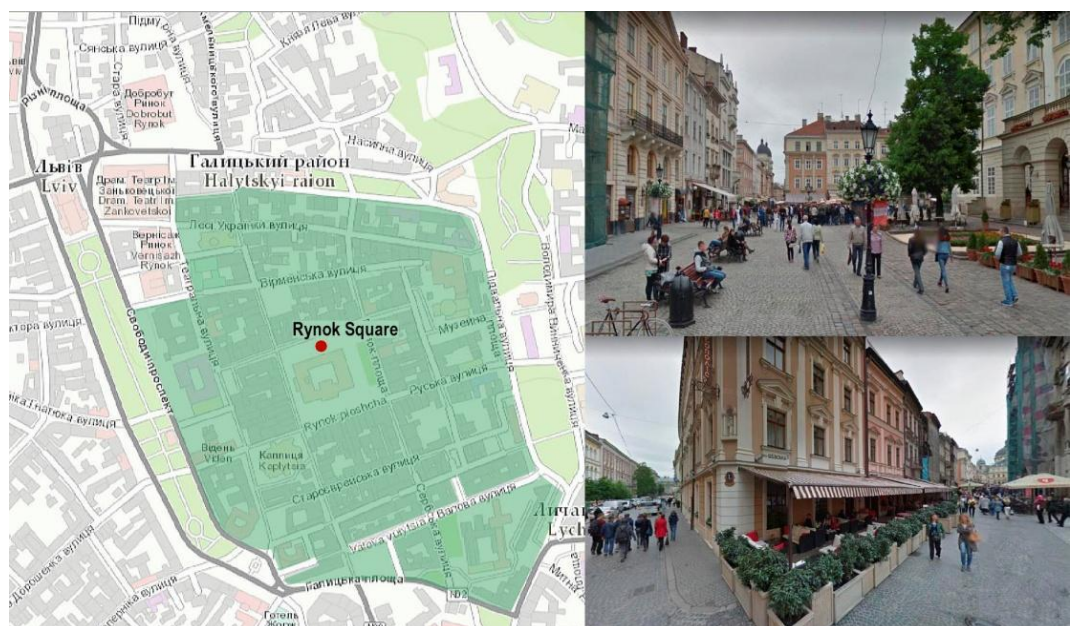


Fig. 4. Pedestrian zone of the historical center of the Lviv city (own elaboration). Images: Google (2019). Google Maps. Lviv, Rynok Square. <https://www.google.com.ua/maps>. Accessed 22.02.2019.

### 3. THE EXISTING STATE OF LVIV CITY PEDESTRIAN SPACES

Designing pedestrian spaces according to modern requirements necessitates a fulfillment of a research about their role in the city. In general, its main task in the city is to provide the possibility of moving a pedestrian from the place of residence to work, study or recreation. The hypothesis in the article is the following: *in the majority of Ukrainian cities, particularly in Lviv, existing spaces do not provide the necessary directions for pedestrians movement.* This research allows us to determine it.

In the article an analysis of the current state of pedestrian spaces in the city of Lviv has been conducted. In order to perform the analysis the method of sociological survey was used. The purpose of the survey is to find out the causes of the pedestrian movement, as well as to learn about the main pedestrian directions in the city.

The survey was conducted in April-May 2018. It was attended by 620 residents of the city of Lviv. The *sample type* of survey was a *typical sample*, which assumes that all units in the general totality are grouped into several larger groups. In this survey, typical groups of respondents were represented by residents of different age groups and social statuses.

Key research outcomes are as follows:

The respondents were divided into three categories by **the period of residence in Lviv**: 1-10 years, 10-30 years and 30 years and more. Accordingly, 32.1% of the polled respondents have lived in Lviv for 1-10 years, 34.6% have lived 10-30 years and 33.3% of respondents have lived in Lviv for 30 or more years.

The division of the **respondents' age** was as follows: 1-20 years, 20-45 years and 40 years or more. Accordingly, 41% of the respondents aged 1-20 years old were interviewed, 41% of those aged 20-45 years old and, finally, 18% of those aged 45 or older.

The survey was attended by the citizens engaged in the **following activities** (Fig. 1): 1) heads of state enterprises; 2) employees of the state institutions; 3) specialists in the field of science, culture, education, preschool education (with higher or basic specialized secondary education); 4) specialists in the medical field (with higher or basic specialized secondary education); 5) law enforcement officers, militaries; 6) entrepreneurs (large / medium business); 7) those who are engaged in small business, work for a businessman; 8) qualified service workers in the various fields (financial, insurance, architectural, legal, etc.); 9) employees in the subsidiary divisions of the enterprise; 10) workers in the service sector (sellers, cooks, guards, waiters, hairdressers, etc.); 11) students; 12) schoolchildren; 13) retired; 14) housewives; 15) people without a permanent place of employment or unemployed.

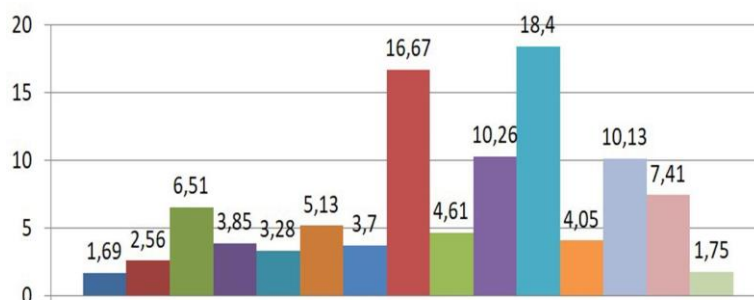


Fig. 5. Diagram of the results obtained by types of respondents' activity. Source: own elaboration

Accordingly, 1.69% of the respondents represented the heads of state enterprises; 2,56% of respondents - employees of the state institutions; 7.51% - specialists in the field of science, culture, education, preschool education; 3.85% - medical specialists; 3.28% - law enforcement officers, militaries; 5.13% - entrepreneurs (large / medium business); 3.70% - engaged in small business, work for a businessman; 16.67% - qualified service workers; 4.61% - employees in subsidiary departments of the enterprise; 10.26% work in the service sector; 18.40% - students; 4.05% - schoolchildren; 10.13% - retired people; 6.41% - housewives; 1.75% of the polled do not have a permanent place of work or unemployed.

The following data is gathered from the responses to the question "How long you spend walking on foot every day":

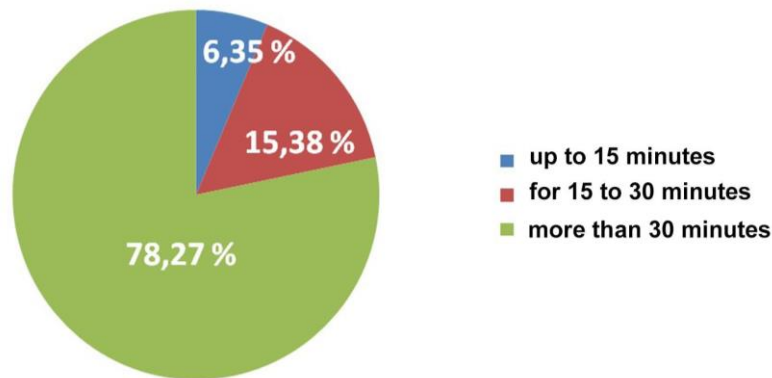


Fig. 6. Diagram of data on the amount of daily walking time on foot. Source: own elaboration

The results show that 78.27% of the respondents walking daily for more than 30 minutes on foot, 15.38% for 15 to 30 minutes, and 6.35% of the respondents walking on foot for up to 15 minutes per day.

Also the questionnaire asked the respondents to select from the 12 possible factors contributing to the comfort of the pedestrian movement. The respondents were given the opportunity to choose several options.

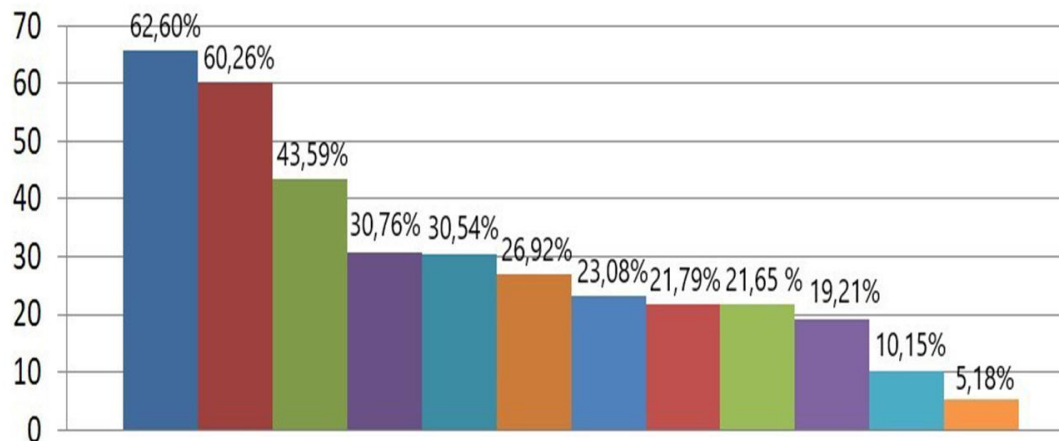


Fig. 7. Diagram of data on the factors which contribute to the comfort of the pedestrian movement. Source: author's own analysis

Thus, 65.60% of respondents consider the width of the sidewalk, which allows to move at the desired speed and not stumble upon other pedestrians, the most important factor in the comfort of the pedestrian movement; 60.26% of respondents are inclined to give preference to the good illumination of the street; for 43,59% the most important is the planting of greenery; for 30.76% - aesthetic design of lanterns / dumps; for 30.54% - the place of protection against weather conditions; for 26,92% - benches; for 23.08% - low noise level; for 21.79% - the division of a pedestrian street into separate fragments with places for rest (arrangement along the pedestrian street the places for rest with a certain step); for 21.65% - barrier-free space, which allows let one`s mind wander, use the phone and not keep an eye on obstacles; for 19,21% - the division of pedestrian lanes directions (by type of paving or elements of urban design: fixtures, lightboxes, elements of landscaping); for 10,15% - availability of thematic places; for 5.18% - the presence of other pedestrians on the street.

#### **Alternative routes for pedestrian traffic (depending on the time of getting to)**

To the question: "Would you change your daily walking route to work / study, if you were offered a more comfortable way, but 10 minutes longer?", 67.08% of respondents would change the route, and 32.92% would not want to change. However, to the same question about changing the route, but if the time difference would be 25 minutes longer, only 20.51% agreed to change the route, and 79.49% would not want to change.

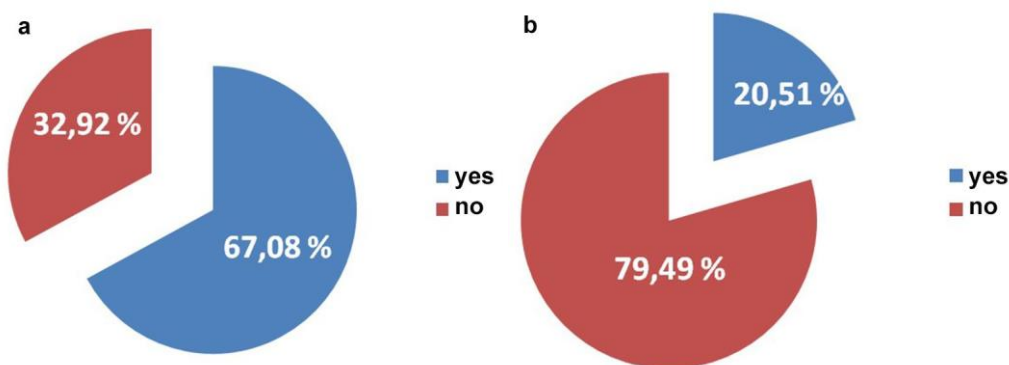


Fig. 8. Diagrams of data on alternatives of picking-up routes: a) if the route is longer for 10 minutes; b) if the route is longer for 25 minutes. Source: own elaboration

The definition of **streets with active traffic, dangerous for pedestrian crossings**, gave the following results:

17.94% of the respondents answered that there are no such streets in their area, 25.66% said that there are such streets, but traffic is regulated there by traffic lights. 56.40% of respondents confirmed that there are dangerous streets in their areas.

Determining **the streets that are dangerous for pedestrian walking along them** (in their opinion)<sup>1</sup> gave the following results:

52.56% of respondents said that there are no such streets in their area, 47.44% said that such streets are.

<sup>1</sup> Criteria for the danger of the street were not provided in the questionnaire, and the respondent should independently determine the concept for himself.



The results of determining the **necessity of the construction of underpasses in Lviv** are the following: 62.82% of respondents consider that the construction of underpasses is not really relevant in the city of Lviv, but 37.18% said that underpasses are necessary.

The next important task of sociological research was the **collecting of cartographic material**.

Among the open type questions the respondent was asked to indicate on the map the route of his daily pedestrian movement. Thus, based on these data, a scheme of pedestrian movement of residents in Lviv was formed. This map shows the direction of the pedestrian movement and its intensity.

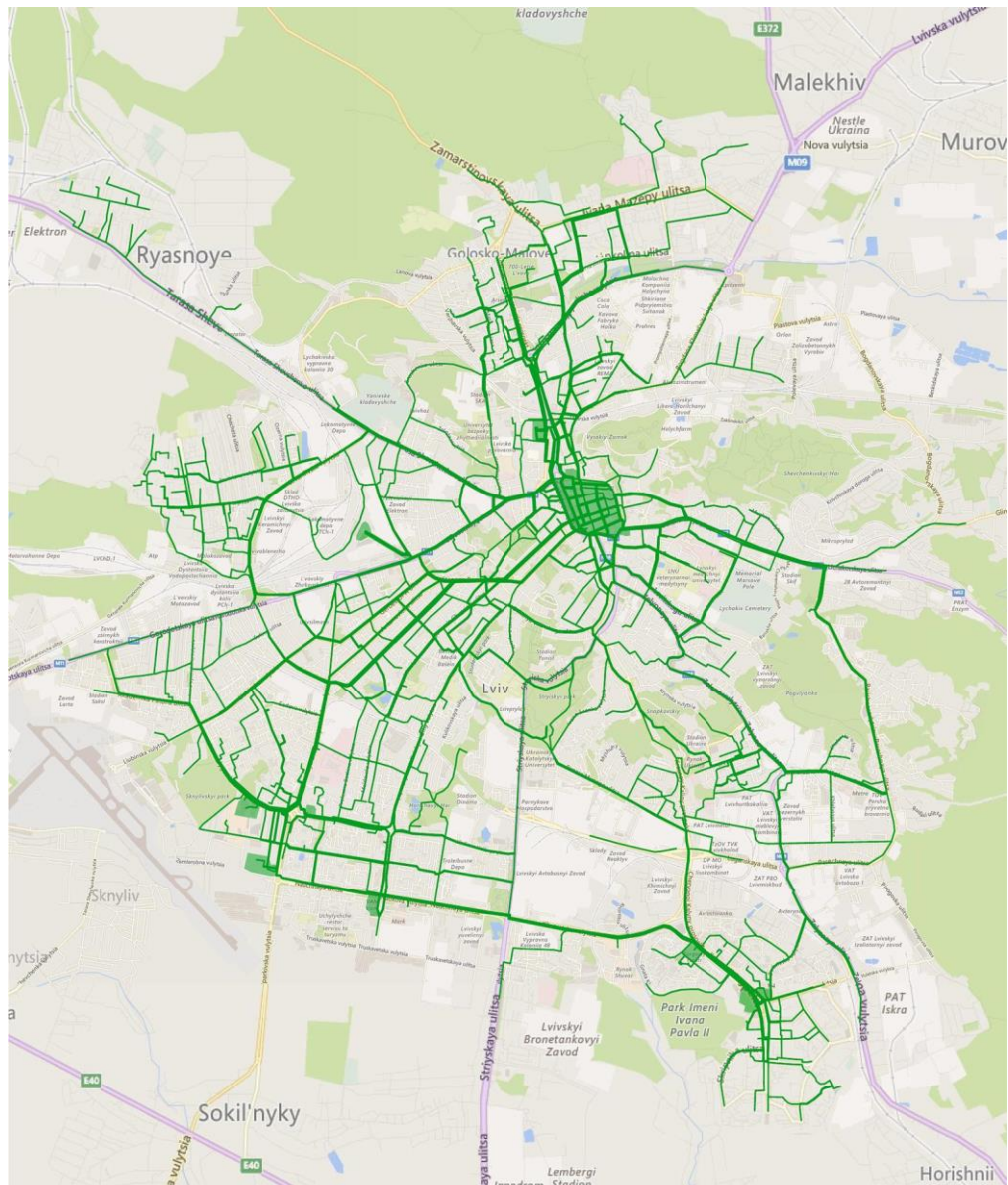


Fig. 9. The scheme of pedestrian movement of citizens in the city of Lviv - the current state. Source: own elaboration

From the scheme, we see that the whole network of pedestrian traffic in Lviv actually duplicates the city's street and road network. All pedestrian spaces are located along existing streets and roads, bypassing parks and green spaces of the city.

The discrepancy between the existing state of the Lviv pedestrian spaces and modern requirements for pedestrian movement promote the search for models of organization the pedestrian network.

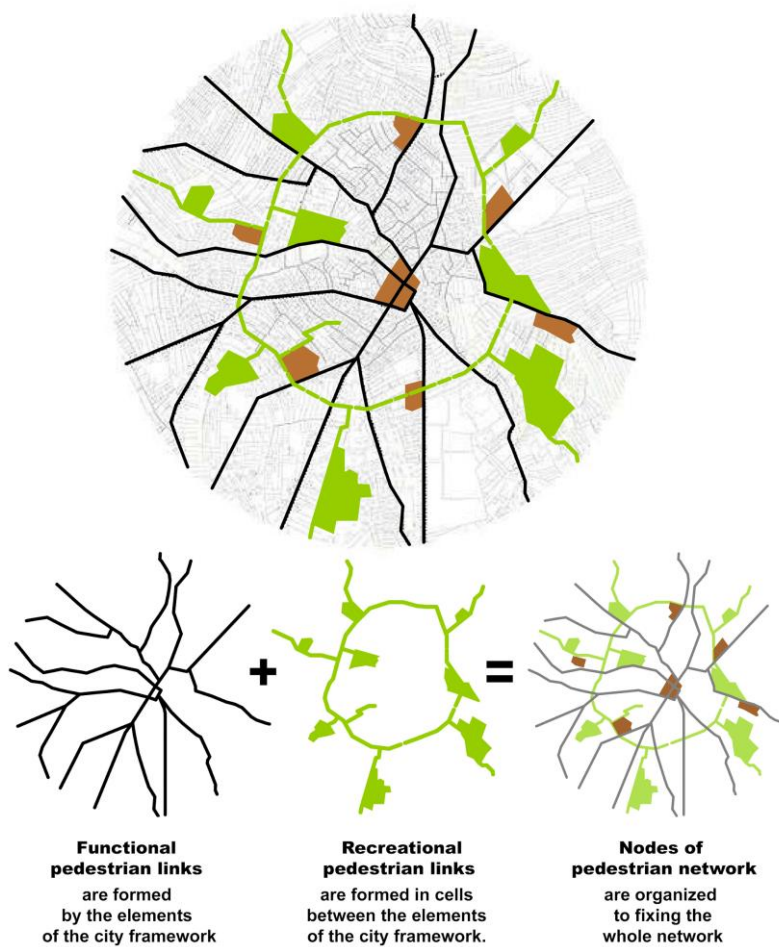


Fig. 10. The proposed scheme of the formation of a network of pedestrian spaces. Source: own elaboration

So, the proposed model can be described as follows:

The network of pedestrian spaces functionates by two different types of pedestrian links: *functional* and *recreational*. Both of them have a different structure and are based on different city components.

*Functional pedestrian links* are formed by the elements of the city framework. They are based on the *transport network* (in the form of sidewalks, ie, partially coincide with the street-road network).

*Recreational pedestrian links* are formed in cells between the elements of the city framework. They often use the city *landscape components*.

It is important that both of the pedestrian links are not superimposed. And *network nodes* must be organized to fixing the whole network.

The proposed approach to the formation of a network of pedestrian spaces will improve the quality of pedestrian movement in Ukrainian cities, provide pedestrian safety and enhance the attractiveness of the urban environment in general.

### 3. CONCLUSION

1. Excessive automobilization of the 20th century led to the search for ways of further development of cities. In 1960s in Europe started the formation of pedestrian zones and pedestrian streets. For today, the main criterion in the European cities is the network of the pedestrian spaces with the possibility of unhindered movement of all groups of the population.
2. In Ukrainian cities, particularly in Lviv, the process of pedestrianization of the historical center began in the late 20 - early 21 century. Mainly, central part of the cities is represented by the pedestrian zone, where the car traffic is prohibited.
3. According to the results of analysis of the current state of pedestrian spaces in the Lviv city, we can see that the majority of respondents spend daily more than 30 minutes on foot (78.27%). But, there are the problems of the functioning of pedestrian spaces: they are located mainly along the streets in the form of sidewalks, without taking into account the necessary directions for pedestrian traffic, without providing connections of major urban areas with the city center and recreation areas. Such simplified interpretation of pedestrian communication does not correspond to the global trends of sustainable urban development.
4. The model of organization of the city pedestrian spaces developed in the article gives an opportunity to form a network of this spaces in Ukrainian cities in accordance with modern requirements of the city sustainable development.

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