Transportation Aspects of Shaping the Public Spaces of Urban Squares in Warsaw (Poland)

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Abstract. The aims of this paper are recognition of transport and urban characteristics of urban squares of the big European city on examples of Warsaw - capital of Poland, examine the relationship between the spatial and functional structure of urban squares and the solution of the road-street system and their transport service and presentation of transportation typology of urban squares. The analysis covered thirty selected Warsaw squares located in various parts of the city, mainly situated in the downtown and city center at left bank of Vistula River. The size of the square measured by the surface of the square, road-street layout of the square, public transportation service, with distinction of individual means of transport and exchangers, presence of pedestrian zones or green zones with pedestrian traffic in the area of the square and linear bicycle infrastructure serving the square and the Public Bike System station as well as possibility of parking solutions were analyzed. The results of the presented in this paper confirm that the analyzed squares are a very important element of creating the functional and spatial structure of the city of Warsaw. The tested squares are characterized by a very large diversity: in terms of surface area, solutions of the street system shaping the spatial structure of the square, the functions and categories of administrative streets crossing the square, traffic density volume, forms of transportation service by public transport and bicycle. Five types of squares were distinguished in terms of transport: pedestrian square, autonomous square, city local traffic square (urban square with local traffic), urban transit square of 1st and 2nd category. Pedestrian zones and green zones with dominant pedestrian traffic are an important element of shaping the space of squares and significantly affect the function of a given square. The analyzes show that, especially in the downtown and center, there are relatively few parking spaces located in Warsaw's squares, and their number is decreasing. This is the result of the actions of city authorities promoting sustainable development policy, including travels to the city center and to downtown by public transport and bicycles. With a view to improving the attractiveness of public spaces in Warsaw squares, attention should be paid to the aesthetics and technical, functional and material standards of the transport infrastructure being implemented, as well as to improve the accessibility of public transport stops, ensure the consistency of the squares' spaces with the bikeway system in the city.

1. Introduction

This paper is a proprietary analysis of infrastructure and transport service solutions of big European city on examples of Warsaw Squares, performed as part of the multi-disciplinary research-study project entitled “Warsaw Square” [1] on order of Warsaw Municipality. City squares are one of the most important elements of the spatial structure of cities and shaping these structures. Place is an
integral element of the city's physiognomy. They are nodes and central points with functional and symbolic significance. They connect roads and transitions [2,3]. Their form and spatial solution significantly influence and enable the shaping of public spaces in cities. They are a place of social life, and their appearance and functional solutions create impact on the reception of space by users. They are also a symbol and a showcase of cities [4].

According to A. Palladio "In cities, it is necessary to establish spacious squares so that people can walk there and discuss each other. There should be several such squares in the city. One of them should be the main square - it could be called - a public square called Piazza Publico."[4]. Czarnecki draws attention to the special role of transport solutions in shaping their functional and spatial solutions [4].

Review of the literature on the subject of this paper [2,3,4,5,6] indicate that squares in cities are characterized by a large diversity resulting from their size, road and street arrangement, spatial development features located in the square, location in the spatial structure of the city as a whole. Transport service solutions are one of the most important in proper planning, design and management of public space. There is a feedback between the transport solution, the development and the housing of the squares.

The transport solution is an element of the spatial structure of the city square and at the same time shapes the structure. Therefore, the solution of transport infrastructure should be adequate to the function and character of the square, and for squares already existing in the aggressive solution of the road and street system it is not allowed to demolish the existing form of public space and introduce disharmony in the urban landscape.

In many Polish cities, the quality of public spaces in urban squares is still relatively low. The dominance of car traffic and the adaptation of their spatial structures to the needs of car traffic had a significant impact on this state. The policy of sustainable development and revitalization activities implemented in the last dozen or so years have a positive impact on changes in the spatial structures of urban squares and the expansion of the space intended for pedestrians and cyclists. In this way, urban spaces can become more friendly places for residents with high aesthetic values and limited car traffic.

At the same time, it should be noted that in many spatial situations, the elimination of traffic from streets serving urban squares is impossible, due to the inability to conduct traffic along alternative road routes, as well as the need to provide access for residents and public facilities located there. Therefore, the study of the relationship between spatial and functional structure, public space and the solution of the road and street system as well as their transport service is an important issue in the aspect of the laws of the functioning of cities. It should be assumed that similar phenomena and functional-spatial relations take place in most large European cities.

2. Aims and scope of analyses
The aims of this paper are following:
- a recognition of transport and urban characteristics of urban squares of the big European city on examples of Warsaw - capital of Poland
- examine the relationship between the spatial and functional structure of urban squares and the solution of the road-street system and their transport service
- presentation of transportation typology of urban squares.

The analysis covered thirty selected Warsaw squares located in various parts of the city, mainly situated in the downtown and city center at left bank of Vistula River (figure 1).
3. The methodology of analyses

Terms of infrastructure solutions and transport service for squares, the following issues were analyzed:

- the size of the square measured by the surface of the square,
- road-street layout of the square, including:
  - spatial layout
  - type of street - street layout of the square
  - the number of traffic levels on the square
  - functions (functional and technical classes of streets) and administrative categories of streets forming the road and street layout of the square
  - the total number of street inlets to the square
  - the number of street inlets of the basic road and street system
  - traffic intensity of the road-street system of the square
  - taking into account the size of streams and the structure of car traffic in the morning, evening and in the off-peak hours
- public transportation service, with distinction of individual means of transport and exchangers,
- presence of pedestrian zones or green zones with pedestrian traffic in the area of the square,
- presence of a linear bicycle infrastructure serving the square and the Warsaw Veturilo Public Bike System station,
• possibility of parking with a distinction of car parks in the street level and underground car parks.

The analysis has been prepared using statistical and cartographic materials regarding the Warsaw transportation system made available on the Internet (Google Earth, Geoportal) or made available by the Municipal Roads Authority in Warsaw (data concerning of traffic flows on the squares) [8]. Local visions of selected squares were taken.

4. Results and discussions
The results of the analyzes are summarized in table 1-3 [9].

4.1. The period of construction and size of squares
“The average square in Warsaw was created in the first half of the 20th century. It covers an area of 1.7 ha. There are five streets leading to it - these are local roads, after which vehicles can move at a speed of 30 and 40 km / h. 50 trees grow on it. The square is generally available for public transport and private cars. There is a car park on the square, six monuments (such as a monument, boulder or plaque). Contemporary art appears here only as a temporary form. On the square there are usually no fountains, no water reservoirs and no watering places. Place is not well dehydrated. On average, thirteen service premises operate on the ground floors of buildings. Large-format advertisements, posters and billboards are located on the squares. During the night is illuminated by the yellowing light of 26 lanterns - buildings and monuments are also highlighted. If there is a religious symbol, it is a cross from the Catholic rite. The square has a dominant - it can be architectural, high or symbolic. It is visible from the square, but it does not have to be within its borders” [1].

The squares analyzed are characterized a very large diversity in terms of surface area, street layout solutions shaping the structure of the square, the functions of streets passing through the square and forms of public transport and bicycle service. The area of analyzed plots ranges from 0.143 ha "Patelnia” and 0.284 ha - Mariensztat Market Place to 4.57 ha - Defilad Square and 3.25 ha - Marshal J. Pilsudski Square. The size of the square, as a rule, affects the spatial form of the square and the method of solving transportation service.

4.2. Road-street system
Car traffic is carried out on the majority of analyzed squares. Exceptions include squares whose main transport function is pedestrian traffic. They are: Castle Square, Old and New Town, Mariensztat Markets Places and the so-called “Patelnia” Square. The number of streets reaching the analyzed squares is from three to seven, however most of them are squares through which run the streets of the basic road-street system, i.e. main and collective streets.

The functional and technical classes of these streets indicate the rank of the square in the general urban transportation infrastructure network. The only one of the analyzed squares, where traffic is on two levels is the Crossroads Square, where the lower level runs without any collision the Lazienkowska Route (Armii Ludowej Avenue), which is the arterial street with a dual carriageway section. The squares that have a road and street system consisting of streets are: Confederation, Gen. J.H. Dabrowski and Defilad Squares represent a group with local street network and their main transportation function is serving of pedestrian traffic. The streets of the primary network running through the analyzed squares are district administrative category (collective streets) or the provincial category (main and arterial streets). Local streets are usually a category of communal streets. The squares, which in the highest degree mark their presence through the streets of the primary network in relation to all streets reaching the square, are: Bankowy, Crossroads, T.W. Wilson, Theater Squares. All streets passing through the last two squares are counted among the streets of the primary street citywide network. The squares, which in the highest degree mark their presence through the streets of the primary network in relation to all streets reaching the square, are: Bankowy, Crossroads, T.W. Wilson, Theater Squares. All streets passing through the last two squares are counted among the streets of the primary street citywide network.
Table 1. Transportation characteristics of selected squares of Warsaw – functional solutions [9]

| number of square analyzed | name of the square       | location by districts | square surface [ha] | number of inlets | number of inlets of principal street network | number of road traffic level | type of street layout                  |
|---------------------------|--------------------------|-----------------------|--------------------|------------------|---------------------------------------------|-------------------------------|----------------------------------------|
| P01                       | "Patelnia"               | Downtown              | 0.143              | 0                | 0                                           | 1                            | pedestrian                            |
| P02                       | European Sq.             | Wola                  | 3.25               | 0                | 0                                           | 1                            | autonomous                            |
| P03                       | S. Starynkiewicz Sq.     | Ochota                | 2.645              | 7                | 3                                           | 1                            | city local traffic square             |
| P04                       | Castle Sq.               |                       | 0.868              | 6                | 0                                           | 1                            | pedestrian                            |
| P05                       | Bankowy Sq.              | Downtown              | 2.38               | 6                | 4                                           | 1                            | transit traffic square I cat.          |
| P06                       | Gen. J.H. Dąbrowski Sq.  |                       | 1.08               | 4                | 0                                           | 1                            | autonomous                            |
| P07                       | Defilad Sq.              |                       | 4.57               | 3                | 0                                           | 2                            | autonomous                            |
| P08                       | Grzybowski Sq.           |                       | 1.45               | 4                | 2                                           | 1                            | city local traffic square             |
| P09                       | Gen. J. Haller Sq.       | Praga North           | 2.97               | 6                | 2                                           | 1                            | transit traffic square I cat.          |
| P10                       | Inwalids Sq.             | Zoliborz              | 3.4                | 6                | 2                                           | 1                            | transit traffic square I cat.          |
| P11                       | Confederation Sq.        | Bielany               | 0.672              | 5                | 0                                           | 1                            | autonomous                            |
| P12                       | Constitution Sq.         |                       | 2.49               | 7                | 4                                           | 1                            | transit traffic square I cat.          |
| P13                       | Krasinskich Sq.          | Downtown              | 1.32               | 5                | 2                                           | 1                            | city local traffic square             |
| P14                       | Crossroads Sq.           |                       | 2.05               | 6                | 5                                           | 2                            | transit traffic square II cat.         |
| P15                       | G. Narutowicz Sq.        | Ochota                | 2.6                | 6                | 2                                           | 1                            | transit traffic square II cat.         |
| P16                       | Marshal. J. Piłsudski Sq.| Downtown              | 3.34               | 7                | 2                                           | 1                            | city local traffic square             |
| P17                       | P. Szembek Sq.           | Praga South           | 1.01               | 7                | 3                                           | 1                            | city local traffic square             |
| P18                       | Polytechnic Sq.          |                       | 1.1                | 6                | 2                                           | 1                            | transit traffic square                |
| P19                       | Warsaw Insurgents Sq.    |                       | 1.96               | 9                | 2                                           | 1                            | city local traffic square             |
| P20                       | Theater Sq.              |                       | 1.59               | 6                | 6                                           | 1                            | transit traffic square II cat.         |
| P21                       | Three Crosses Sq.        |                       | 2.8                | 9                | 2                                           | 1                            | transit traffic square II cat.         |
| P22                       | Lublin Union Sq.         | Mokotow               | 0.949              | 7                | 4                                           | 1                            | transit traffic square II cat.         |
| P23                       | Wilno Sq.                | Praga North           | 0.903              | 6                | 4                                           | 1                            | transit traffic square II cat.         |
| P24                       | T.W. Wilson Sq.          | Zoliborz              | 2.04               | 5                | 5                                           | 1                            | transit traffic square II cat.         |
| P25                       | Iron Gate Sq.            | Downtown              | 1.23               | 4                | 0                                           | 1                            | autonomous                            |
| P26                       | Zawiszy Sq.              | Ochota                | 0.62               | 5                | 5                                           | 1                            | transit traffic square II cat.         |
| P27                       | Saviour Sq.              |                       | 0.714              | 6                | 3                                           | 1                            | autonomous                            |
| P28                       | Mariensztat Market Place |                       | 0.284              | 6                | 0                                           | 1                            | autonomous                            |
| P29                       | New Town Market Place     |                       | 0.763              | 3                | 0                                           | 1                            | pedestrian                           |
| P30                       | Old Town Market Place     |                       | 0.691              | 6                | 0                                           | 1                            | pedestrian                           |

Squares located in left bank of Vistula River: Squares located outside of downtown and city center.
Table 2. Transportation characteristics of selected squares of Warsaw – traffic flow volume and service by public transport [9]

| number of square analyzed | name of the square                     | estimated volume road traffic [vehicles/hour] | transportation public service | transportation public exchanger |
|---------------------------|----------------------------------------|-----------------------------------------------|--------------------------------|--------------------------------|
|                           |                                        | morning peak off-peak period evening peak     | bus   | tram | metro | train |
| P01 “Patelnia”            |                                        |                                               | x     | x   |        |       |
| P02 European Sq.          |                                        | 1342 742 752                                  | x     | x   |        |       |
| P03 S. Starynkiewicz Sq.  |                                        | 752 788 824                                   | x     | x   |        |       |
| P04 Castle Sq.            |                                        |                                               | x     |     |        |       |
| P05 Bankowy Sq.           |                                        | 3672 3348 2828                                | x     | x   | x     | x     |
| P06 Gen. J.H. Dąbrowski Sq.|                                        | 542 536 698                                   | x     |     |        |       |
| P07 Defilad Sq.           |                                        | no data no data no data                       | x     | x   | x     | x     |
| P08 Grzybowski Sq.        |                                        | 1050 1192 1424                                | x     |     |        |       |
| P09 Gen. J. Haller Sq.    |                                        | 424 367 445                                   | x     | x   |        |       |
| P10 Inwalids Sq.          |                                        | 1916 1056 1476                                | x     | x   | x     |       |
| P11 Confederation Sq.     |                                        | 180 130 136                                   | x     |     |        |       |
| P12 Constitution Sq.      |                                        | 3102 3710 3804                                | x     | x   | x     | x     |
| P13 Krasinskich Sq.       |                                        | 1536 1304 1412                                | x     |     |        |       |
| P14 Crossroads Sq.        |                                        | 2152 1902 2152                                | x     |     |        |       |
| P15 G. Narutowicz Sq.     |                                        | 2876 2424 2456                                | x     |     |        |       |
| P16 Marshal. J. Pilsudski Sq.|                                    | no data no data no data                       | x     |     |        |       |
| P17 P. Szembek Sq.        |                                        | 984 824 854                                   | x     | x   |        |       |
| P18 Polytechnic Sq.       |                                        | no data no data no data                       | x     |     |        |       |
| P19 Warsaw Insurgents Sq. |                                        | 812 1238 868                                  | x     |     |        |       |
| P20 Theater Sq.           |                                        | no data no data no data                       | x     |     |        |       |
| P21 Three Crosses Sq.     |                                        | 2235 1909 2286                                | x     |     |        |       |
| P22 Lublin Union Sq.      |                                        | 4000 3500 4000                                | x     | x   |        | x     |
| P23 Wilno Sq.             |                                        | 2000 2000 2000                                | x     | x   | x     | x     |
| P24 T.W. Wilson Sq.       |                                        | 5766 3418 4396                                | x     | x   | x     | x     |
| P25 Iron Gate Sq.         |                                        | no data no data no data                       | x     |     |        |       |
| P26 Zawiszy Sq.           |                                        | 6845 7048 6639                                | x     | x   | x     | x     |
| P27 Saviour Sq.           |                                        | 2489 2465 2688                                | x     |     |        |       |
| P28 Mariensztat Market Place|                                    |                                               | x     |     |        |       |
| P29 New Town Market Place |                                        |                                               | x     |     |        |       |
| P30 Old Town Market Place |                                        |                                               | x     |     |        |       |

Legend:
x – presence of transportation mode in the service or element of transportation infrastructure in space of square;
x\(^a\) – transportation service by W-Z Road Itinerary;
x\(^b\) – periodic transportation public service (during the weekends and selected days Street Nowy Świat is closing);
x\(^c\) the public transport line runs under the square but does not support it;
particular feature is not present in the square
### Table 3. Transportation characteristics of selected squares of Warsaw – infrastrukture for cyclists' and parking service [9]

| number of square analyzed | name of square                  | pedestrian zone or green zone with pedestrian traffic | cyclists’ infrastructure | parking service |
|--------------------------|--------------------------------|-------------------------------------------------------|--------------------------|-----------------|
|                          |                                |            | cycling ways | station of urban public bike Veturilo | parkings in level of ground area | underground parking |
| P01                      | " Patelnia"                   | x          |             |                                | x                             |                  |
| P02                      | European Sq.                  | x          |             |                                | x                             |                  |
| P03                      | S. Starynkiewicz Sq.          | x          |             |                                | x                             |                  |
| P04                      | Castle Sq.                    | x, s       |             |                                | x                             |                  |
| P05                      | Bankowy Sq.                   |             |             |                                |                               |                  |
| P06                      | Gen. J.H. Dąbrowski Sq.        | x          |             |                                | x                             |                  |
| P07                      | Defilad Sq.                   | s          |             |                                | x                             | x                 |
| P08                      | Grzybowski Sq.                | x, s       |             |                                | x                             |                  |
| P09                      | Gen. J. Haller Sq.            | x          |             |                                | x                             |                  |
| P10                      | Inwalids Sq.                  | x          |             |                                | x                             |                  |
| P11                      | Confederation Sq.             | x          |             |                                |                               |                  |
| P12                      | Constitution Sq.              | x          |             |                                | x                             |                  |
| P13                      | Krasinskich Sq.               | x, s       |             |                                | x                             | x                 |
| P14                      | Crossroads Sq.                |             |             |                                |                               |                  |
| P15                      | G. Narutowicz Sq.             | x          |             |                                |                               |                  |
| P16                      | Marshal. J. Piłsudski Sq.      |             |             |                                |                               |                  |
| P17                      | P. Szembek Sq.                | x          |             |                                |                               |                  |
| P18                      | Polytechnic Sq.               | x          |             |                                |                               |                  |
| P19                      | Warsaw Insurgents Sq.         | x          |             |                                |                               |                  |
| P20                      | Theater Sq.                   | x          |             |                                |                               |                  |
| P21                      | Three Crosses Sq.             |             |             |                                |                               |                  |
| P22                      | Lublin Union Sq.              | x          |             |                                |                               |                  |
| P23                      | Wilno Sq.                     | x          |             |                                |                               |                  |
| P24                      | T.W. Wilson Sq.               | x          |             |                                |                               |                  |
| P25                      | Iron Gate Sq.                 |             |             |                                |                               |                  |
| P26                      | A. Zawisza Sq.                | x          |             |                                |                               |                  |
| P27                      | Saviour Sq.                   |             |             |                                |                               |                  |
| P28                      | Mariensztat Market Place       | x          |             |                                |                               |                  |
| P29                      | New Town Market Place          | x          |             |                                |                               |                  |
| P30                      | Old Town Market Place          | x          |             |                                |                               |                  |

Legend:
- x - presence of transportation mode in the service or element of transportation infrastructure in space of square;
- s - the bikeways comes tangentially to the square;
- x^d - public underground car park above the metro station, but not accessible to car user;
- particular feature is not present in the square

#### 4.3. Volume of traffic

The largest traffic flows pass through the squares classified into the category II Urban Transit traffic square. T.W. Wilson Square is at the same time one of the most-loaded Warsaw squares, just like Zawiszy and Bankowy Squares. According to the data of the Municipal Roads Management in Warsaw, the traffic flows on the abovementioned the first two squares, taking into account their spatial configuration, depend on the time of day from approx. 3400 vehicle/hour to approx. 7000 vehicle/hour. On the Bankowy Sq. load is smaller and ranges from approx. 2800 vehicle/hour to 3700 vehicle/hour. Traffic on T.W. Wilson Sq. characterizes by high variability depending on the time of day. At the morning peak, the load on the square is approximately 5800 vehicle/hour and
significantly decreases in the period up to approx. 3400 vehicle/hour, after which in the evening peak rises to the level of approx. 4400 vehicle/hour. This variability in time is due to the location of the square on an important street itinerary linking Bielany with the city downtown and urban center, as well as the location of the square in a residential area. The itinerary of the Slowacki - Mickiewieza Streets’ is the shortest connection to the center and Marszalkowska Street. On the other hand, the least loaded car traffic is the Confederation Square located in the central part of Bielany. Traffic streams running through the square do not exceed 200 vehicle/hour. It creates very good environmental conditions living in its immediate vicinity.

4.4. Transportation public service
Most of the analyzed squares are served by public transport (twenty four on thirty analyzed squares). Public transport: bus, tram, metro and rail serve Warsaw squares. The most commonly used means of transport is a bus (as many as twenty two out of twenty four squares), then a tram (fifteen out of twenty four). Subway only the serve: T.W. Wilson, Bankowy, Patelnia and Wilno Squares. Only two Warsaw squares are served by rail. They are Vilno and Zawiszy Squares, where are located station of suburban lines. The structure of used public transport means corresponds approximately to the structure of the use of means of transport throughout Warsaw (most of them buses and trams). On two of the analyzed squares are situated bus station, i.e. Defilad and Wilno Squares. Thirteen out of thirty of analyzed squares can be considered as public transport interchange nodes that are significant in the city. Twelve of them provide transfers for various public transport means.

4.5. Pedestrian zones and green areas with pedestrian traffic
The analysis of the use of the area of Warsaw's squares indicated squares, which in their structure have a pedestrian zone or a pedestrian zone in the green in their area. These zones were distinguished on the following squares:
- with spaces excluded from car traffic,
- with clear green zones used by users, or
- with extensive pedestrian surfaces used not only to move, but also to stay in this area.

According to the author, among the analyzed squares, pedestrian zones or green zones with pedestrian traffic occur on twenty three out of thirty squares. The pedestrian zones which are the largest in relation to the square area outside the areas genetically designated for pedestrian traffic i.e. Old and New Town, Mariensztat Squares, Iron Gate Square, Patelnia) should be considered, among others: European, Castle, Defilad, Gen. Haller, Szembeka Constitution, Marshal J. Piłsudski, Polytechnic Squares.

4.6. Bicycle infrastructure
Bikeways are present in nine out of thirty and up to seven of the examined squares reach tangible routes for cycling. This means that up to sixteen of thirty squares can be reached using the dynamically developing bicycle infrastructure network. In many places there is a lack of continuity of the existing cycleways network. This state of affairs is generally due to the fact that the squares in question were created in the old years, when no cycleways system was planned as part of the separated infrastructure for this group of users of this transportation system. On half of the examined squares there are stations of the Veturilo public bicycle system in Warsaw, and in some cases these stations are also located near the square.

4.7. Parking service
Only eight on thirty squares cannot park cars. Most of them are car parks in the square level. In recent months, as a result of actions aimed at improving the quality of public spaces in the city center, the number of available parking spaces is reduced. This applies, among others Warsaw Insurgents Square. Only on Defilad and Krasinskich Squares there are public underground parking lots. In addition, at T.W. Wilson Square above the tunnel of the metro line is located a two hundred parking stands for car, but for unknown reasons parking is not available for users.
4.8. Transportation classification of squares

Transportation classification of squares based on the analysis of the spatial layout, functions of streets serving squares, an attempt was made to classify the transport of selected squares in Warsaw. Five types of squares were distinguished in terms of transport:

- Pedestrian square,
- Autonomous square,
- City local traffic square,
- Transit traffic square of the 1st category,
- Transit traffic square of the 1st category.

The pedestrian square - As the name suggests, it is the square on which pedestrian traffic prevails and the service of car transport is limited to the delivery traffic and access to the property for residents. These types of squares include: Castle, Old and New Town Markets Squares and so-called "Patelnia".

The autonomous square - It is a square in the structure of which only local streets can be distinguished and it is located away from density traffic. This type of square in Warsaw, it includes among others: Gen. J.H. Dąbrowski, Defilad, European, Confederation and Iron Gate Squares.

The City local traffic square - It is a square that is operated tangentially at most up to the streets of the collective class, which makes transport has a role as supports the spatial structure of the square. This type are represented by the following squares: Starynkiewicz, Grzybowski, Gen. Haller, Krasinskich, Marshal J. Piłsudski, Szembek, Warsaw Insurgents, Polytechnic, Theater and Saviour.

The urban transit traffic square of the 1st category - It is the a square through which transit passes in relation to the spatial structure of the square, the streets are heavily laden with the big density traffic. Carriageway of streets crossing the square are led in one spatial corridor. This type of square in Warsaw is represented by: Bankowy, Three Crosses, Wilno and Lublin Union Squares.

The urban transit traffic square of the 2nd category - It is a square where transit traffic passes in relation to the spatial structure of the square the streets. Very dense car traffic is run through the main or arterial street or in the second level. The carriageways of streets are spatially separated way, in a circular or grating manner, and they connect to each other outside the area. Among others the squares: Invalids, Constitution, T.W. Wilson and Narutowicz are included to this type.

5. Conclusions

The results of the presented above confirm that the analyzed squares are a very important element of creating the functional and spatial structure of the city of Warsaw. The tested squares are characterized by a very large diversity:

- in terms of surface area,
- solutions of the street system shaping the spatial structure of the square,
- the functions and categories of administrative streets crossing the square, traffic density volume,
- forms of transportation service by public transport and bicycle.

Pedestrian zones and green zones with dominant pedestrian traffic are an important element of shaping the space of squares and significantly affect the function of a given square.

The analyzes show that, especially in the downtown and center, there are relatively few parking spaces located in Warsaw's squares, and their number is decreasing. This is the result of the actions of city authorities promoting sustainable development policy, including travels to the city center and to downtown by public transport and bicycles.

For improving the attractiveness of public spaces in Warsaw squares, attention should be paid to the aesthetics and technical, functional and material standards of the transport infrastructure being implemented, as well as to improve the accessibility of public transport stops, ensure the consistency of the squares' spaces with the bikeway system in the city.
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