ABSTRACT. Urban public transportation system changes, in post-communist period in Iasi municipality. During the transition period, from the communist era to the market economy, the Romanian cities suffered important mutations such as deindustrialization, urban sprawl, changes in functional areas, the increase in cars number, etc. These changes required a quick adaptation of the urban public transportation system. This paper tries to reveal if these changes happened in the proper manner, taking into consideration the fact that Iasi city is one of the most polluted in the country. In the communist era, the city of Iaşi has experienced a great development, becoming an important industrial, educational and medical center. The transportation system is the effect of the historical context of overall urban development of the city of Iasi. From the public transport point of view, adaptation to external transformations in the post-communist era is difficult, because suburbanization is not sustained by the development of an adequate transport infrastructure, which means for the home owners higher transportation costs and a higher motorization degree. The lack of public transport routes from these areas leads to higher traffic values in the city which remains the main polarization center of the region. Nowadays there is a series of major deficiencies in the level of polarization of the transport network in the urban space. Adapting supply to demand transport consists of qualitative restructuring of public transport.

Keywords: spatial changes, built space, sub-urbanization, deindustrialization, public transport

1. INTRODUCTION

Since the dawn of the industrialized society, the individual’s ability to travel became the key of his survival and development and by extension the key for the survival and development of the society itself. The arrival of the automobile at the end of the 19th century brought the promise of solving all transportation problems. The ease of travel brought by the automobile made cities “smaller”, but on the other side, as a result of rapid rise in cars number, cities begun to be developed and shaped by-and for the personal car, making transportation difficult for those who couldn’t afford one. The main response to this problem was the development of urban public transportation systems.

This study focuses on the ways in which the public transportation system of Iaşi has adapted to the internal and external changes of the urban space which occurred in
the post-communist period. The city of Iaşi is the main urban center from north-eastern Romania.

2. DATA AND METHODOLOGY

The spatial analysis of the public transport system and of the events that influenced the need of changes was carried out through both quantitative and qualitative methods and data.

Territories have often different assets because of different architecture of transport networks. GIS offers the possibility to analyze actual state of networks but also to simulate future changes in places’ importance, rank and benefits when do occur changes in networks [1].

On the basis of maps, and data from local authorities, a data base was created, comprising information about the evolution of built space, the main polarizing centers of daily and weekly fluxes, population density, stop location and routes of the public transport system. Methods utilized in this study include analysis, synthesis, comparison, observation and GIS techniques (georeferencing, digitization, spatial analysis). For the creation and processing of the data base, various specific software was used: ArcGIS 10.2, TNT Mips 6.9, Google Earth, Ms Excel.

3. RESULTS AND DISCUSSIONS

During the communist era the city of Iaşi faced great development, becoming an academic and medical center of national importance. In 1992 the cultural-educational and medical function represented 15.26% of the workforce [2]. Also Iaşi faced great industrialization, hosting numerous factories with thousands of employees. The public transport system was extended and designed to transport the workers from residential neighborhoods to the industrial areas.

Public transport has a long history in Iaşi, the first electric tramway being opened in 1900. Since then the network has been extended and completed with bus routes. In 1970 the city had a fleet of 128 trams and 184 buses.

During the communist period (1945-1990) the city of Iaşi had an accelerated and systemized territorial and demographic evolution. The 1989 moment marks the start of profound changes in the industrial landscape, affected by abandonment and demolitions and by functional and physical reconversions [3].

**Internal transformations after 1990**

After 1990 deindustrialization led to the tertialisations of the workforce. One consequence of this was the lower number of workers that were employed in the industrial areas. In 2004 the demographical structure of the city’s neighborhoods was greatly modified as a result of the increased territorial and professional mobility of the population [2].

Electronic copy available at: https://ssrn.com/abstract=2700158
Deindustrialization of the economy led to smaller fluxes towards the former industrial areas and an increase in fluxes towards the new commercial-industrial areas spawning west of the city. Reconversion of unused industrial spaces into commercial areas, shops and offices conserved a significant part of the old urban fluxes prior to 1990.

From the perspective of the public transportation system, the diversification and the spatial diffusion of economic activities gets translated into an increase of the distance between housing and the work place and decreased efficiency of the system. In order to adapt to the new population mobility needs, the public transport system suffered a series of changes: the discarding of a number of routes which served the industrial areas, new routes, shifting of the main road hub towards the center-south part of the city, development of a multiple hub type of network, but the infrastructure still is adapted to the old requirements.

The main fluxes within the city occur between just a few polarizing centers: home – work/study place (daily frequency), home – commercial/recreational centers (weekly frequency) and home – health center (monthly/yearly frequency).
In the post-communist period a spatial diffusion of the services takes place, but the central area still retains its dominant position, housing the main administrative, educational, justice and health centers. After 1990 and especially after 2000 mall type shopping centers and supermarkets begin to appear. These increase external fluxes and create demand for public transport [2].

With regards to the population density, it is remarkable that 80% of the city’s population is concentrated in the southern half of the city. This influences the number and frequency of public transport vehicles, the direction of the main routes and the polarization of certain portions of the territory [4].

As a result of the moral and physical wear of the fleet of trams and buses and also because of a decrease in the number of the traditional clients (industry workers), the income and the quality of services of the Autonomous Public Transport Company of Iaşi (RATP Iaşi) suffered. The lack of a quality service stems from the lack of reform and maladjustment to the current needs. In 2014 RATP entered in an insolvency procedure, signaling the urgent need of reform.

**External transformations after 1990**

As an effect of deindustrialization after the 1989 Revolution, the urban limits expand significantly by assimilating limitrophe localities. This way, connections between the periphery of Iaşi and neighboring villages are created. Population censuses from 1992, 2002 and 2011 confirmed the trend of falling numbers in Iaşi and an increase in the population of neighboring communes [2].
The suburbanization process is also being influenced by the migration of the urban population towards the neighboring villages with the aim of assuring a better quality of life. It can be considered a reversal of conditions: the replacement of the rural exodus (as a result of closing of factories and lack of employment) with a new rural phase, of individuals with above average financial status moving towards the periphery of the city. After 1990 the lack of legislative discipline led to chaotic development and spread of built space where previously was farmland.

From the public transport point of view, adaptation to external transformations in the post-communist era is difficult, because suburbanization is not sustained by the development of adequate transport infrastructure, which means for the home owners higher transportation costs and a higher motorization degree. The lack of public transport routes from these areas leads to higher traffic values in the city which remains the main polarization center of the region.

In the analysis of the service area of the public transport network it was taken into account that the maximum distance that a person in willing to walk up to the station is 400 meters. [4]. A series of major deficiencies are revealed regarding the level of polarization of the metropolitan area by the public transport network: limited coverage, low accessibility, the lack of a ring that would connect the main radial axes, isolation of some neighborhoods and villages from the periphery. At present the old network can’t provide services in the face of rapid demand increase, as a result of the densification of economic activities and individual houses. The best served areas remain the ones near the main road axes.
The lack of connectivity between the radial axes is an effect of the geomorphological conditions of the city. The high relief energy means that certain areas cannot be served by public transport. For the existing routes, the high slopes lead to high fuel consumption, slower acceleration and top speed, and higher mechanical wear of the vehicles. Another factor that influences the structure of the public transport network is represented the rivers crossing the city and the railway tracks. These can be crossed only where are viaducts and bridges, and can act as choke points for the traffic, producing delays for the public transport [6].

![Fig. 4 Number of people on a 400m radius from a stop](image1)

![Fig. 5 Transport capacity per section and junction](image2)

The analysis of the public transport required calculating the maximum hourly transport capacity for each route, and then combining these into a map. The transport capacity increases towards the central areas. At the junctions where many routes converge can be identified areas with very high transport capacity. The stations from these junctions have the potential of becoming hubs with a many connections, but need redesigning in order to fulfill this role efficiently.

Another area in which the system is lacking is the absence of timetables in the stops, and a general lack of information for the passengers regarding routes and time of arrival of the next vehicle. It is recommended that an equal fallow-up interval be maintained between vehicles and installing GPS devices on them.

To provide public transport for the metropolitan area, it is recommended using the existing railway infrastructure, and organizing the system on the model of western suburban rail services, with stops 2 km apart. Villages further away from the railway track can be served by microbuses synchronized with the train timetables, in order to form a hierarchical system.
CONCLUSIONS

The structure of the public transport system is the result of the historical context of the evolution of the city of Iaşi. It is adapted to the local topography and follows the main communication axes.

Deindustrialization of the economy together with suburbanization modifies the demand for public transport and fluxes between neighborhoods. Adaptation to the new demands requires qualitative restructuring.

The Public Transport System in Iaşi city is not yet adapted to the new socio-economic conditions resulted in the post-communist period, although some modifications were made. A new concept is needed in order to satisfy commuters' daily transportations needs.

As a result of analyzing the results a series of measures were proposed that would use the existing infrastructure as much as possible and would correct the current problems of the public transport system.

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