IMPACTS AND CONSEQUENCES OF URBAN SHRINKAGE ON THE SOCIETY, INFRASTRUCTURE AND ENVIRONMENT FROM TIMISOARA

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Abstract: Timisoara is nowadays the 2nd city of Romania, an important economical, social and cultural urban centre. Until 1990, the city had a relatively continuous growing, natural at the beginning of the 19th century, but artificially accelerated during the communist period. After the political change, the city has started a natural process of reconfiguration, similar with the national and euro-regional trends. The decline of the Timisoara’s population was almost constant during 1990-2008. The statistical fact is eloquent: during 2 decades, Timisoara has lost 14% of its population. This paper tries to identify the reasons and the premises of the city shrinking towards business and employment, social infrastructure and education, technical infrastructure.

Rezumat: Impactul depopulării urbane asupra societăŃii, infrastructurii şi mediului în Timişoara. Timişoara este în prezent al doilea oraş din România, un important centru urban economic, social şi cultural. Până în 1990, oraşul a avut o creştere relativ constantă, într-o formă naturală la începutul secolului XIX-lea dar şi într-o formă accelerată artificială în timpul perioadei comuniste. După schimbarea politică oraşul a cunoscut un proces natural de reconfigurare, similar cu tendinŃele naŃionale şi euro-regionale. Descreşterea populaŃiei timişorene a fost aproape constantă în perioada 1990-2008. Datele statistice sunt elocvente: de-a lungul a 2 decade, Timişoara a pierdut 14% din populaŃia sa. Această lucrare urmăreşte să identifice motivele şi premisele depopulării urbane raportat la mediul de afaceri si ocuparea forţei de muncă, infrastructura socială si educatie, infrastructura tehnica.

Key words: urban shrinkage, employment rate and unemployment, technical infrastructure, social infrastructure and education

Cuvinte cheie: depopulare urbana, ocupare si somaj, insfrastructura tehnică, infrastructura socială si educatie

1. PATTERNS OF SEGREGATION AND SOCIAL COHESION

Even if the shrinking process is a constant reality for the last almost 20 years, the city of Timisoara does not look to be seriously affected. On the basis of the previous analysis, the artificial urbanization that has directly affected the city during the communist period has accumulated a structural pressure that nowadays is practically regularized. We are talking about the persons that can now move away in any foreign country; about the persons from rural areas that were forced to live in the city and which are now unemployed; about the
families that can now adopt any measures of family planning; about the persons that were forced to inhabit in uncomfortable block-flats and which have the possibility nowadays to build a house on ground, even not quite in Timisoara but close enough (until 20 km). All these factors have direct influences upon the distribution of the population density across the city. A very professional representation (elaborated by an architectural project) looks like:

Thus, it can be observed a quasi-eclectic distribution, the quarters with high density (concrete block-flats) been quite mixed with other quarters with low density (historical houses). Generally talking, Timisoara keeps the concentric profile, with 2 or 3 waves of modern construction around the city core but with interactions with former villages integrated as historical neighbourhoods. Some industrial facilities that are not working any more represent a very valuable land close to centre that can be reused in other ways (as residential projects or company buildings etc.). The city trend to extend its influence on the surrounds (under the perspective of the future metropolitan area) and on new and very consistent residential neighbourhoods are developed in all the closest villages.

2. BUSINESS AND EMPLOYMENT

The evolution of Timisoara’s business area is indirectly reflected by a series of indicators that will be summarily presented forward:

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2.1 Employees

The 1990s have been characterized by reorganizations and even by the dissolution of some companies which existed at that time, with direct consequence on the decreasing of the number of employed people in Timisoara. Starting with 2000 the local business area records a slight increase reflected by the new employment opportunities for the existing working force. Therefore, the number of unemployed people in Timisoara starts to decrease until a minimal point of 1.6% in 2006 and 2007. With the economical recession this indicator has growing back to around 4% (in 2009).

The number of employed people per fields of activity also reflects the local business area’s dynamic. Therefore we can observe that during the analyzed interval some fields of activity were affected by a decrease of the number of employees while other fields enjoy a constant increase in their number of employees. The regression, with the biggest impact on the number of employed people in Timisoara, can be found within the industrial activities area which has constantly recorded decline concerning the number of employees, reaching by the end of the 90’ almost half of the working force volume specific during 1991.
At the opposite poll, the fields of activity, which enjoyed ascendant evolutions concerning their number of employed people, have had a slow but constant evolution. Within the commercial activities sector (re- tail or en-gross) we observe a quite atypical situation with massive fluctuations among the employees.

![Figure 4 The evolution of the employment by sector](image)

2.2 Employment rate and unemployment rate

The picture of the business area and of employment cannot be complete only by reporting it to the number of employees or sectors of activity, without taking into account aspects which concern the population’s occupation rate as well as unemployment rate in Timisoara.

The population’s occupation rate also reflects the local business area’s evolution and the way in which the economic development manages to include the local resources of working force. Analyzing the evolution of this indicator, we observe that it oscillates between the limits of the interval 85 – 65, the maximum being reached in 1991 and the minimum in 1999. Starting with the year 2000 we record in Timisoara a slight constant increase among the number of foreign investments. Therefore, we observe an increase of the employment rate at local level. Similar to these structural changes we observe a jumpy evolution of the unemployment rate in the interval 1991-1999. Afterwards, the unemployment rate has recorded descendent evolutions, reaching by the end of the year 2008 in Timis County the lowest level from Romania.
(3). Urban GVA or GDP per head - GDP per head records a quite constant increase by the end of 1999 and may reflect the efficiency of the local business area. After the year 2000, the GDP growth rate records an exponential growing rate, all this due to the foreign investments and also due to the specific activity of this new companies (the car industry develops and also the electronic and IT products industry).

3. SOCIAL INFRASTRUCTURE AND EDUCATION

Timisoara’s current educational infrastructure includes all fields of education, starting with pre-school education and ending with post-doctorate studies. After longitudinal analyses on the evolution of school infrastructure and the number of pupils we observe that this reflects the social demographic changes that are specific to the population of Timisoara. The first consequences on the educational system in Timisoara as a cause of the social demographic changes refer to the preschool education that was affected by the decreasing birth rate. To be more precise, the decrease of birth rate has caused a decrease of the target population, which the preschool education was addressing to. Therefore, the number of children enrolled in
kindergartens and schools has decreased, which caused suppression, merging or the temporarily closing of some kindergartens and/or day nurseries. The 15-years interval to which we refer in the next graphic reflects the descendent evolution of the number of kindergartens and day nurseries in Timisoara. This number has reached its minimum in 2006 when only half of the kindergartens and day nurseries, which existed at the beginning of the 1990s, were functional.

![Figure 8 The evolution of the number of kindergartens in Timisoara](image)

![Figure 9 The evolution of the number of children in Timisoara who regularly go to kindergarten](image)

Reported to the number of children included in preschool educational system, we observe, that until the year 1999, there has been an obvious descendent tendency. Later, a slight increase among the number of children enrolled in kindergartens/day nurseries was recorded, followed by a quite constant evolution. If we combine the two indicators – the number of kindergartens and day nurseries in Timisoara and the number of children who regularly go to these institutions - we can observe an excessive agglomeration tendency, reflected by the average number of children who come back to kindergarten/day nursery. The last two years of the analyzed interval reflect an over agglomeration of preschool institutions and it seems that the average number of children reported to a kindergarten reaches twice the mean existent at the beginning of the year 1990. This situation, on medium and long term, may have as consequence a decrease of the educational level and a reorientation of the population towards other communities where the access to the educational infrastructure is easier.

![Figure 10 The dynamic of the average number of children reported to one kindergarten between 1992-2007](image)
In comparison with preschool education, secondary and high-school education have recorded quite constant evolutions, and, when some schools were temporally suspended, their number did not generate impact consequences over the children’s access to education. This time, the social demographic changes caused by the decreasing birth rate have generated quite delayed changes in the local school network. The direct consequences will be recorded after approximate 7 years when the children’s generation reaches the age necessary to enrol in the educational network.

The number of children enrolled in the local school network dynamics records an obvious descending tendency. Therefore, in 2007 we observe a decrease in the number of children who regularly go to local schools with almost 20% less in comparison with 1990. This situation may be, either, due to the fact that the birth rate is reduced or to the fact that, although the children have been born in Timisoara, they later left the city along with their families. Another reason for this decrease may be that of the augmentation of the number of children not enrolled in the school network. We may appreciate that, starting with 2009, the number of children enrolled in school will increase in comparison with the previous years.

Compared to the over agglomeration of kindergartens, in the last years, in the school network we can observe a slight un-crowd. The number of children reported to a school is decreasing, which means that these changes have a favourable character for the educational climate.

Along with the educational component, the social activities network includes as indicator the access to medical services. Concerning this issue, we draw our attention to the number of medical doctors reported to 100 000 inhabitants. Analyzing this indicator we observe an augmentation of the access to medical services. This situation appears not only because Timisoara is a university city with medicine universities and university clinics but, also, because of the governmental measures of alignment to the standards of the European Community which have made easier the access to medical services.
In the analyzed interval we can observe a 2.8 times increase of the number of doctors reported to 100,000 inhabitants in comparison to 1990.

![Figure 13: The evolution of number of doctors per 100,000 inhabitants](image)

**Figure 13: The evolution of number of doctors per 100,000 inhabitants**

**Evoluția numărului de medici la 1000 de locuitori**

### 4. HOUSING

To compensate the lack of data on the rent and sale price of households, we undertook a field survey, conducted between January-February 2010. The investigation included 60 subjects of whom, 26 are living in Timisoara at least for 30 years. All respondents are, at least, in one of the following circumstances: (1) have rented a household for a minimum period of two years, (2) own a household for at least two years, (3) rent and have in property one or more residential properties between 1965 to 2009. Research tools included the following items: 1. Period of time in years, 2. The way housing: rent or property, 3. Dwelling space of the household which is stipulated in the property or rental contract, 4. The price of real estate sale or the price of a month's rent (for the period 1990 to 2009 the prices of rent have been circulated in Romanian lei, German marks, U.S. dollars or Euros).

In determining the average sale price for a period of one year, were required at least 3 valid responses and to determine the rental price at least 5 valid responses. Most of the rental leases were not based on legal documents, but only mutual agreements of the owners with tenants, while sales were traded under legal contracts. For this reason, we chose to increase the number questionnaires about the rent, having no other means to verify the data. The results of the field surveys show that, throughout the period 1970 – 1990, prices remained unchanged and were: 2.23 lei/sq m for rent and 1,895.1 lei/sq m for sale.

Inflation ran high due to reform failures, the legalization of owning foreign currency in 1990, and the bankrupt policies of the former communist era, reaching rates as high as 300% per year in 1993. Several factors, such (i) Inflation (which was very high in Romania of 1990s), (ii) Timisoara’s economical development, (iii) the increasing demand for housing and (iv) the relatively easy access to bank loans properties, all concur to raise the purchase price of housing and rents. In the 2000s, house prices reached and exceed sales prices of similar homes in most developed European countries. In 1991, the average selling price was 2,148 lei/sq m, in 1996: 206,460.7 lei/sq m, and in 2004 reached 19,563,722.4 lei (ROL)/sq m. On July 1st, 2005, the leu was re-valued at the rate of 10,000 "old" lei (ROL) for one "new" leu (RON), thus, psychologically, the purchasing power of the leu was bought back in line with those of other major Western currencies. Afterwards, the sales prices of
households continue to grow, even if at a lower rate: in 2006: 3,276.6 RON/sq m, and in 2009: 3,989.5 RON/sq m.

After the fall of the communist regime, the housing constructions have been almost stopped. During the beginning of 1990s, were completed only the residential buildings that were started in the 1980s. Later, the construction of apartment blocks has known a weak trend, driven in particular by some state initiatives, developed primarily by National Housing Agency (NHA). NHA has made a few housing construction Programs for youth or for certain occupational categories (medical residents). Recently, in the month of May 2009, the Romanian Government launched the "First House Program" that guarantees 80% of the mortgage loans for a maximum of 60,000 euros/apartment. However, the program has no significant results so far. The real estate market strongly stimulates the new constructions, especially after 2000, when appear the first major housing developers in the constructing industry in Timisoara. Also, we can observe the increasing trend of dwelling space, from 12.35 sq m/person in 1990 to 16.97 sq m/person in the year 2009 and increased preference for buying houses on the ground at the expense of flats in blocks of concrete.

The 2000-year’s period is marked by residential areas extending into peri-urban areas, in communes and villages surrounding Timisoara. Still respecting the projection of Burgess’s concentric model, Timisoara is developing many satellite residential areas radial around the city. Currently are included in such rural areas the communes: Dumbrăvița Ghiroda, Chișoda, Giroc, Urseni, Uliuc, Moșnița Vechе, Moșnița Nouă, Giarmata Vii, Giarmata, Sănandrei, Săcălaz, Romanian Sânmihaiu, German Sânmihaiu, Sag. The infrastructure aspects and the poor access to utilities in these new luxury residential neighbourhoods in rural areas surrounding Timisoara remain still problematic. Working-class residential areas constructed during the communist regime were systematically projected, with all the necessary elements to ensure the building housing infrastructure, utilities, schools, kindergartens, libraries, police stations, post and telecommunications, commercial, etc. Currently, there are not still strong enough developers that can support such extensive construction projects. On the other hand, the real estate market, the fiscal and banking system cannot guarantee safe investments on this scale.

5. TECHNICAL INFRASTRUCTURE

In the description of currently available infrastructure of Timisoara we focused on the following aspects considered to be essential: the public transport network, the heating system, water and sewerage supply and the sanitation network.

5.1 Transport Network

The network of local transport is served by an autonomous company (Autonomous Transport Direction of Timisoara - RATT), which is administrated by the municipality. The local public transportation includes three types of vehicles: buses, trolley buses and tramways, and serving 35 local routes and surrounding areas. In the recent years, the length of the local routes recorded a number of changes, RATT continuously trying to fold the shape of lines in order to support local transportation needs.

Since 2009, local transportation includes in its services some supplementary suburban town areas. For these additional transport routes are being used mainly buses, which required a partial renewal of the car park of the local transportation provider. It also
can be observed a decrease in the number of existing vehicles (the car park has decreased by 39% compared to 1990) and the decrease in the number of trams in operation. In the following graphs (Figures no 35 and 36) we can observe the evolutions of the routes length and of the public transportation car park of the RATT.

In the last five years the local public transportation provider has registered a constant extent of the lines length, the number of passengers has increased and also the number of kilometres per year shows a positive trend.
Timisoara is one of the few large cities in Romania where the centralized public heating system is still functional, despite the decrease in the number of users of this service. Over the past 10 years at the local level, due to relatively high costs and especially the need to improve thermal comfort, some buildings have opted for separate heating systems. The most popular and commonly used heating systems are the private gas-fired central heating.

![Figure 18 The evolution of thermo energy and Hot water](image)

Previous figure shows the descending trend of centralized public heating system, reflected both in terms of heat supplied to the population and hot water distributed to users. The future trend is likely to decline more consistently, generated mainly by eliminating the present subsidies offered by the municipality for these utilities. For this reason, the final price will increase at least with 50% and possibly many users will renounce of these services in favour of an alternative heating system.

5.3 Water supply system and sewerage networks

The water supply and sewerage services are currently provided by the regional operator AQUATIM, which in recent years has extent constantly to other localities, namely counties of Romania. Timisoara's water supply is made from two separate sources: surface and depth. The processing of the drinkable water is achieved through three waterworks. More than two thirds of the water, which are distributed to consumers, comes from the Bega Water Treatment Station and the rest of the city's drinking water requirement is provided from underground sources through Ronat Water Treatment Station and Urseni Water Treatment Station (data from Annual Report of AQUATIM, 2009). Along with the mentioned sources of water, in recent years many wells were drilled in public area and offered in every district of the city, their number reaching to 100 in 2009. Water distribution network has a total length of 616.5 km (in 2007) and wastewater collection network reaches 489 km (in 2007).

![Figure 19 The evolution of the Water mains system and the Sewerage networks](image)
Wastewater and the rain water is collected by the gravitational fall, than is passed to the wastewater unit system and is processed by Sewage Treatment Station of the city (built in 1912, and are constantly subjected for process of modernization). Water demand for the period 2000 - 2009 shows major changes, reaching in 2009 almost half of the average consumption of year 2000. (This observation is based only on the water distribution network not including the use of public and individual wells drilled. Also the decrease in the consumption average is a result of the network improvement and modernisation, which decreases the water loss in the network).

<table>
<thead>
<tr>
<th>Year</th>
<th>Water Demand (L/person/day)</th>
<th>Wastewater (L/person/day)</th>
</tr>
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<tbody>
<tr>
<td>2000</td>
<td>89.06</td>
<td>66.43</td>
</tr>
<tr>
<td>2001</td>
<td>66.43</td>
<td>51.63</td>
</tr>
<tr>
<td>2002</td>
<td>51.63</td>
<td>49.275</td>
</tr>
<tr>
<td>2003</td>
<td>49.275</td>
<td>48.18</td>
</tr>
<tr>
<td>2004</td>
<td>48.18</td>
<td>47.46</td>
</tr>
<tr>
<td>2005</td>
<td>47.46</td>
<td>47.085</td>
</tr>
<tr>
<td>2006</td>
<td>47.085</td>
<td>46.72</td>
</tr>
<tr>
<td>2007</td>
<td>46.72</td>
<td>45.625</td>
</tr>
<tr>
<td>2008</td>
<td>45.625</td>
<td>44.53</td>
</tr>
<tr>
<td>2009</td>
<td>44.53</td>
<td>44.53</td>
</tr>
</tbody>
</table>

Figure 20 The evolution of water demand and Wastewater (L/person/day)

Evoluția cererii de apă

6. LAND USE AND ENVIRONMENTAL QUALITY

Physical geography and geology:
Timisoara is located in the south-eastern Pannonian Plain, in the area of the rivers Timis and Bega ramble. Timisoara highest rate is in the northeast, the neighbourhood "Între Vii" at the 95 m and the lowest point is to 84 m in the west district Mehala (Rona□). Administrative territory of the city landscape and suburban municipalities include the following main units: High Plain Living Giarmata Vii – Dumbrăvița, Low Plain of Torontal and Alluvial Plain of Bega.

In terms of tectonic, Timisoara is located in an area with east-west oriented strike fault, marked by the existence of Șanovița extinct volcano.

Seismological studies show that seismic lines Periam-Varia□-Vinga intersect the northwest of Timisoara and Radna-Parăa-Șag the southeast of the town. Timisoara is a very
active seismic centre, but from the numerous earthquakes observed, only few have exceeded the magnitude 6 on the Richter scale. As a result of the petrographic composition of surface formations, on the territory of Timisoara appeared the compaction clay-sandy substrate phenomenon. This is highlighted in Elisabetin and Cetate districts, and also elsewhere where they formed cravers.

Waters:
Bega River has its spring in Poiana Ruscă Mountains (Padeş peak at 1150 m altitude). Bega canal was built between 1728 and 1760 and includes the distance from Timisoara to the point of Begas watering, over a length of 115 km. The Bega canal was projected for navigation, access barges of 600-700 tonnes and an annual transportation capacity of 3,000,000 trucks. Timisoara has many natural lakes, formed in adjacent areas to city (near Kuncz district, near village Giroc, Snakes Lake in the Green Forest) and lakes of anthropogenic origin (Fratelia, Freidorf, Moşniţa, Mehala, Youth Strand), notable by their location on line contact with suburban towns.

Timisoara's groundwater is quite close to surface, with a depth between 0.5 - 4 meters. Ground water layers increase the depth from north to south, from 4 m to 80 m deep and contain drinking water, thus providing some urban consumption requirements. Timisoara has also deep water, captured in Union Square (hypothermal), south of Cetate and district Fabric (mesothermal) with therapeutic value, used for the spa. Thermo-mineral waters are used for cure and recreation resort in Timisoara by supplying the Hospital of Physiotherapeutic spa and two sports facilities with swimming pools.

Green Areas:
A key role in achieving an ecological balance of the surroundings, is the harmonization of relations between built and open spaces and planted area of the city and surrounding territory. In the ecological functionality and equilibrium, the green areas have the ability to retain precipitation, reduce and purify water leaks, fix soil, retain alluvial materials, regulate temperature and air humidity. Green space in the public domain in Timisoara is represented by parks, squares and street alignments and comprises a total of 168,500 trees.

According to the National Institute of Statistics, at 31.12.2006, the total area of green spaces in Timisoara was 502 ha, consisting of: Parks 87.59 ha; Squares 12.97 ha; Alignments in neighbourhoods 328.58 ha; Forest curtain 22.00 ha; Green Forest area 50.70 ha. In 2006 green space was 15.9 square meters per inhabitant, respectively 0.5 trees per capita. The Government Emergency Ordinance no.114/17.10.2007 foresees that in 2010 the green space should be 20 square meters per inhabitant, which will correspond to 630 ha, and in 2013 the area of green spaces have to reach 26 mp per capita. It results that, in 2013, the total area of green space will

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increase to 819 hectares in the city of Timisoara. This law was one of the arguments that led to the establishment in 2007 of a specialized structure on environmental issues in Timisoara: "Environment Office" in the City Hall of Timisoara (by HCL no. 124/2007)

Environment:
The Government Emergency Ordinance no. 195/2005 on environmental protection, approved by Law no. 265/2006 stipulates in Article 90 that the local government have tasks and responsibilities for the conservation and protection of urban green spaces, surveillance operators subordinated to prevent the accidental removal of pollutants or uncontrolled waste deposits reusable, provide sanitation localities, maintenance, management markets, public parks and green spaces, promoting a proper attitude about the importance of environmental protection and has the responsibility to have staff for environmental protection. In the Timis County, specialized operators accredited by local councils carry out municipal waste management. In Timisoara, the problem of municipal waste is under basic changes for achievement of the environmental protections standards.

In December 2005, it was initiated a dual collection system involving the distribution out free recyclable waste bins/bags of 240 l (in areas of buildings) or low-density polyethylene bags of 140 l (in areas of homes), mark properly with collection instructions. In Timisoara collection is performed on two fractions: recyclable waste (paper / cardboard, plastic, aluminium dose, PET) and household garbage. Currently dual collection system is being implemented in the whole city and growing in line with the waiver of collection system by battery container as it was found that dual-collection system is more efficient. Hazardous waste is given the highest possible impact on human health and the environment. In Timisoara and in the region this type of waste does not represent a high risk: in the Timis County in 2006, approximately 4% were hazardous waste.

Analysis reports indicate that the environmental conditions in Timisoara in the year 2009 are almost between the normal ranges:

- The noxious air pollution exceeded the daily limit value for gravimetric determinations at concentrations of particulate matter (dust), the maximum recorded being 77.37 µg/m3 (TM1 station) and representing 154.74% of the limit in accordance with MAPM Order no. 592/2002. Concentrations of sulphur dioxide, nitrogen dioxide, carbon monoxide, ozone and particulate sediments were between normal limits.

- The measurement of acoustics urban and determine the level of noise generated by road traffic equivalent Lech and the activities of companies, by day in accordance with STAS 6161/3j82 in residential areas and roadways and intersections in the vicinity of Timisoara exceed of the maximum permissible limit in most key measurements (as a percentage of 89.65%). In making these determinations was used Bruel & Kjaer sound level meter type 2238 MEDIATOR

- Regarding radioactivity at the city level, the values recorded through gamma dose determinations were within the limits of variation of natural background radiation, without reaching the warning limit.

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The Timisoara’s portals:

http://www.timisoara.ro/
http://www.e-timisoara.info/
http://www.timisoara.com/