BABEŞ-BOLYAI UNIVERSITY

FACULTY OF GEOGRAPHY

DOCTORAL SCHOOL OF GEOGRAPHY

PHD THESIS

URBAN MOBILITY IN CLUJ-NAPOCA CITY

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CONTENT

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Summary:

There is a two-way relationship between the development of a city and transport infrastructure. The more developed is the transport system, the greater is the development potential of a locality. The increase in population of the localities around an urban center, due primarily to the change of residence, leads to the depopulation of the city centre, many of the residential buildings being transformed into office buildings. The development in the last decades of Cluj-Napoca city and of the neighbouring area, both from the economic and the spatial extension point of view, impacts on the road communication routes. The interrelationship between economic growth and the increase in the number of inhabitants of the city, amid internal migration (from 317,953 inhabitants recorded in the 2002 Population and Housing Census, to 324,576 inhabitants recorded in the 2011 Population and Housing Census), caused the expansion of existing areas and the creation of new neighbourhoods. The economic development of the city also attracted a population that settled in the neighbouring communes, exerting high pressure that led to the explosion of the real estate market and the uncontrolled development in a very short time of the living space within them.

The speed of these cities' expansion has hampered a well-planned urban development, which is why they face the problem of too long trips, severe traffic congestion, pollution, road accidents, etc. The exception is not the city of Cluj-Napoca, whose urban space has undergone numerous transformations, gradually becoming a motorized city. Population mobility is not a choice, but a necessity, and with the expansion of the area covered by constructions in the municipality, the increase in population of the neighbouring localities operating in Cluj-Napoca and the inefficiency of the public transport system, the population has become dependent on cars.

CHAPTER 1 presents some introductory elements, namely the objectives of the doctoral thesis. The main objective of the doctoral thesis is to evaluate the accessibility and urban mobility in Cluj-Napoca for the years 2015 and 2020.

CHAPTER 2 theoretically presents the two concepts, "accessibility" - the ease with which a person can get to a certain place and "mobility" - the movement of the population within the city.

CHAPTER 3 presents the database that was used to draft this doctoral thesis, respectively the methods for assessing accessibility and urban mobility. The database used includes several categories of data that refer to: traffic in Cluj-Napoca - speed of public transport for 2015 and 2020, speed of cars for 2015, passenger volumes in the city and within the first chain of communes in the Cluj Metropolitan Area, the movement of taxis within the city,

respectively the car park. Also, in this doctoral thesis, demographic and economic data were used, mostly from the 2011 Population and Housing Census. The database used contains detailed information regarding age, sex, place of birth, the place of residence, the place of activity, the last educational institution graduated, the sector of activity, etc.

CHAPTER 4 presents the results of this doctoral thesis. The city of Cluj-Napoca has faced an increase in the number of people from both the county and the neighbouring counties, especially after 2006. This increase in population led to the expansion of the built urban space, with new housing districts in the city, especially in the south. The expansion of the built space has also led to the development of the public transport network. At present the city has 62 transport lines that mostly connect the neighbourhoods with the central area, the industrial area or the neighbourhoods between them.

The transport system in the city has undergone numerous changes in terms of the distribution of the transport network, but also in terms of the availability of public transport, respectively their speed of movement. Thus, the speed of public transport has decreased in 2020 compared to 2015, which is due to the growing number of cars, which have led to heavy traffic and thus increased travel time.

The migration of population inside the central area and inside the neighbourhoods is time-consuming, regardless of whether personal cars or public transport are used. Following the analysis, the areas in the city with high travel time were identified due to the fact that some neighbourhoods do not have public transport network or the frequency of public transport in that area is low. On the other hand, there are the most populated districts of the city (Mănăştur, Grigorescu, Gheorgheni, Zorilor and Mărăşti-Între Lacuri) which have good travel times due to the very high frequency of public transport. In terms of driving around the neighbourhoods, the best values were recorded in the neighbourhoods located in the immediate vicinity of the central area. Therefore, it can be said that the time of travel by car within the neighbourhoods is closely related to the area of the neighbourhood; the smaller the area, the shorter the average travel time. The highest values of travel time by car were recorded in the Mănăştur and Mărăşti-Între Lacuri neighbourhoods and in the transition zone of the central area. This is due to the very large number of vehicles traveling on the East-West direction and which most of the time they also have their destination in the central area.

Regarding the radial mobility, the analysis shows that the travel time decreases as we move away from the central area, the highest values being recorded for the buildings in the south and north of the city. Even in the most populated and oldest districts of the city, traveling by public transport and walking can take up to 30 minutes, although the inhabitants benefit from

many means of public transport. Travel time from the central area to the outskirts and vice versa using the car is often halved compared to using public transport, which causes inhabitants to travel more and more by personal car. Comparing the years 2015 and 2020, the access from the periphery to the central area has been improved, using public transport, which is primarily due to the increased attention paid to this means of travel, by introducing new transport lines, extending existing lines, the implementation of public transport lanes, but also by increasing the frequency of public transport.

Peripheral mobility has been studied with the destination of the Iris neighbourhood, a neighbourhood well served by public transport, especially during peak hours, because here there are a significant number of companies that offer jobs to citizens. However, traveling in this part of the city is time-consuming, especially if public transport is used, with travel time values reaching 45 minutes for most of the population. This is also the reason why most people prefer to use individual motorized transport.

Public transport plays a key role in assessing accessibility, especially when it comes to a constantly moving city, in which the public transport network must be seen as a complex system that must also meet the need for population mobility. The differences between the analysed time slots are given by the availability of public transport stations, while the differences between the two years, 2015 and 2020, are given on the one hand by the changes in the public transport network, and on the other hand the availability of a means of public transport during that time. Regardless of the time interval analysed, over 70% of the city's population needs up to 5 minutes to reach the nearest available transport station, which shows that the population benefits from this point of view from a very good accessibility, only that it must also be related to the frequency of public transport. For the inhabitants of the city that live in the southern or northern part of the city, the accessibility to public transport differs from one time interval to another, and the main cause of these differences is given by the availability of public transport stations. The unavailability of public transport, especially during peak hours, causes the population to use other modes of transport, mainly using the car, which is also reflected in travel times, traffic jams, etc.

The connection between the city of Cluj-Napoca and the neighbouring rural area is made either by road or by rail. The city of Cluj-Napoca has good connections with the neighbouring rural area, and the schedule of available means of transport in the area of influence is correlated with the schedule of urban lines. All other localities situated in the area of influence of the city can be accessed by public transport by road, but the availability of regular trips has major differences, consequently, the first ring of communes can be accessed over 50 regular trips

daily, in time which is often available at the extremities, perhaps only one bus in the morning and one in the afternoon, which often requires commuters in these communes to use their personal cars to get to work. Most commuters come from communes bordering the municipality, are young, and many work in the tertiary sector.

Cluj-Napoca city expanded uncontrollably in a relatively short time, and the speed of this phenomenon prevented a well-planned urban development, and a large part of the newly built areas were connected to the city by poorly developed roads, public transport being non-existent in the areas in question. Due to moving to the outskirts of the city, the people are more and more addicted to personal vehicles. Moreover, the citizens of the city who live in the old neighbourhoods are dependent on individual transport, mainly motorized, on the one hand due to the public transport network which does not always ensure good access to various locations and institutions, and on the other hand, comfort offered by personal cars plays a very important role.

Chapter 5 presents the measures to improve accessibility and urban mobility by implementing operations, such as: closing traffic arteries in the central area, making a new road connection, reorganizing the public transport network and creating a „Park and Ride" type arrangement, and finally, the conclusions of this doctoral thesis.

The study highlighted the extent to which the mobility needs of the population are met, given that urban expansion must be seen in relation to the connectivity and availability of public transport, which makes it possible to identify key elements of public transport that can be improved to reduce the peripheral effect, but also to prevent unequal development, so that marginalized areas can be spatially integrated.