



## Spatial structure of a city and the mobility of its residents: functional and planning aspects

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**Abstract.** In the latest conceptions of urban development planning, special attention is paid to the resident. This is reflected especially in the increasingly popular idea of creating 'a city for people'. This somewhat banal slogan has got an increasingly sensible and justified theoretical support, as well as examples of practical solutions. The idea of planning urban development to meet human needs (a city for people) underlies many conceptions of urban development, especially those the basic goal of which is to limit suburbanisation unfavourable from a general social point of view and to rationalise the mobility of city residents. It has long been known that their mobility reflects the spatial structure of a city, and that their ever more intensive movement is not favourable from the ecological, social and economic points of view. In this situation it is necessary to shape the spatial-functional structure of the city in a way that will, first, restrict this mobility and, secondly, that will change the ways and means by which residents move. However, in order to make changes in the existing spatial structures in a rational way, it is necessary to know the mobility of city dwellers, its causes, directions, distances covered, and duration. What we shall present in this paper are structural and functional conclusions resulting from an analysis of the mobility of residents relevant for planning. Although our reflections will be primarily theoretical in nature, in many cases they will be backed up by empirical studies, mostly concerning Poznań.

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## 1. Introduction

In the literature on the subject one can find various definitions of the goals of spatial management and physical planning. For the authors of this paper, but not only, the basic goal of spatial management is spatial order understood as an organisation of a territorial social system that accommodates the criteria of general social rationality deriving from the laws of nature, rules of social behaviour, principles underlying the economy, aesthetic canons, and the functionality of the development of an area (Chojnicki, 1989; Parysek, 2006; Mierzejewska, 2009a). The adoption of such a goal of spatial management assumes treating the city as a functional whole (a system) in the planned development of which both structural aspects (nature, residents, the economy, elements of spatial development) and functional ones have to be accommodated.

This article seeks to present structural and functional aspects of planning the development of a city that follow from the mobility of its residents. In Polish cities this mobility intensifies over time, generated not only by conscious, deliberate choices of residents, but also by the spatial structure of a city and how they perceive it. It is an increasingly complex structure in which places where people live and those where they seek to attain various more or less individualised goals have been separated under the influence of all kinds of factors.

There are several aspects that can be considered when planning the growth and spatial development of a city. One of them seems to be the above-mentioned mobility of residents, which is generally determined by the city's spatial-functional structure. One of the ways of restricting this mobility can be a change in the city's spatial structure and its rational development. What we have in reality, however, is the dependence of residents' mobility on the city's spatial structure on the one hand, and the forma-

tion of this structure by such mobility-related factors as individual motorisation and public transport on the other (Parysek, Mierzejewska, 2014).

The goal of this article is to draw attention to the fact that the mobility of city residents, unfavourable from a general social point of view, can be restricted by the city's properly developed spatial-functional structure.

## 2. Mobility of city residents and structural and functional aspects of spatial management

The document regulating this type of activity in Poland is the Physical Planning and Spatial Development Act of 2003, still in force although generally criticised and continually supplemented and amended (Billert, 2006; Jędraszko, 2008; Parysek, 2010a, 2010b; Mierzejewska, 2009b).

As has been stated in the Introduction, an important factor affecting the development of and changes in the spatial structures of a city can be its residents' mobility, and more specifically its limitation. This is important because with advancing civilisational-cultural development, the intensity of people's movement in space (also urban space) keeps growing for a variety of reasons.

Spatial management is often defined as simultaneous management of space and management in space, which is also stated in the Physical Planning and Spatial Development Act. The management of space involves the creation of spatial structures, while management in space is giving specific functions to the structures created. On the one hand, this means that structures are created in order to perform certain functions, and on the other, that performing those functions is not possible without a prior creation of concrete structures (Parysek, 2006). The city should therefore be a whole, the

spatial structure of which is functional from a general social point of view; functional, i.e. readily accessible to residents, in spatial and temporal terms. The criterion in the assessment of functionality is the time left at one's disposal after all the necessary matters have been arranged (the time to satisfy concrete needs and perform one's duties).

As has already been stated, what can affect the development of spatial structures in a city is the mobility of its residents, a characteristic feature of population behaviour since the dawn of time. In a narrow approach, mobility means people's capacity to move in their daily life. In this context we can speak of "*potential mobility* (the ease with which a person could travel should they wish to do so) and *actual mobility* (which describes movements undertaken in visiting other people and facilities)" (Goodall, 1987: 307). In a broad approach, mobility means all categories of population movement. Repeated, cyclic movement made in short periods of time and not involving a change in the place of residence is called circulation, while migration is a usually one-time movement connected with a change in the place of residence or with leaving the place of residence for a longer period (cf. Zelinski, 1971; Jagielski, 1974; Ogden, 1984; Goodall, 1987; Johnston et al., 2003). The mobility of city residents embraces primarily oscillatory, repeatable, cyclic, and occasion-demanded types of movement, i.e. ones that fall under the notion of circulation.

Population mobility is characteristic first of all of residents of cities. This is basically due to three fundamental factors: (1) needs and necessary activities of residents, (2) their social diversification, and (3) the spatial structure of a city.

The causative role of needs and necessary activities springs from physiological determinants and is connected with the operation of a household. Social structures determine the goals and character of movement on the one hand, and on the other the possibility of their accomplishment, while a city's spatial structure determines the geographical directions of movement, its duration, and cost. The causative role of the spatial structure of the city in movements of its residents results primarily from a land-use pattern where places of residence are distant from those of goal accomplishment, making it necessary to travel in specified directions. Those directions do not follow from the spatial structure of

a concrete city alone, but also from the perception of this structure by individuals. It involves not only its assessment in terms of its functional diversification, distance, and the time and costs needed to cover it, but also in terms of a subjective evaluation of destinations and in terms of one's priorities and preferences (Wlamsley, Lewis, 1984). By living in a specific milieu, including a city, people learn about this milieu. They observe, collect and filter information, learn and remember characteristic features, create mental pictures – and on this basis follow a certain type of behaviour accompanied by concrete movements. Basic movements involve such places as home, place of work or education, shopping and service places, facilities for religious practices, leisure-time activities, entertainment, social contacts (places of residence of the family, friends), etc. Obviously, the spatial dimension of mobility depends on the one hand on one's place of residence and destinations, and on the other, on one's age, sex, social status, interests, health, etc. For those reasons spatial relations (movements) of a pupil will differ from those of a student, those of a solitary working person from those of a working person running a household, a pensioner, a healthy or an ill person, one bringing up children or grandchildren, one declaring concrete interests, etc.

Perhaps the first to study people's movement in a city (to be specific, in Paris) was Chombart de Lauve (1952) in the 1950s, who later found many followers in other countries. The spatial behaviour patterns he examined were largely determined by social factors and by differences in the spatial-functional structure of the city and its subjective perception.

The social or socio-demographic factors influencing movements of city residents include primarily: their age (the stage in their life cycle), marital status, family status, level of education, wealth, health status, interests, ways of spending free time, and other factors (Korcelli, 1974; Jałowicki, 1972; Pickvance, 1973; Matykowski, 1990). The opinion gaining ground recently is that transport has a growing impact on spatial interactions, including population movements, also intra-urban ones. This is due to networks making it possible to move between two points in a city, and on the other hand, to rapid transport which allows reducing the time necessary to travel concrete distances (Domański,

2012). It is obvious that an analysis of the transport system and the travelling time cannot be made without reference to the spatial-functional structure of the city, which after all influences the mobility of its residents in a fundamental way. The spatial structure, with its qualitative diversification we find in modern cities, offers a wide choice of places of residence and places of goal accomplishment, and therefore some rationalisation or even optimisation of movement. An effect will be saving free time, which can then be put to various uses, and saving the cost of moving. Unfortunately, the tendency in urban planning to separate city areas performing various functions that resulted from the provisions of the Athens Charter of 1933 (or the housing-estate model of residential construction and the development of intra-urban industrial areas adopted in Poland after the Second World War, which was certainly an unintentional response to the Athens Charter) led to a 'channelling' of population movement in a city, mostly in 'place of residence – place of work' and 'place of residence – places of goal accomplishment' relations, and an intensification of transport problems connected with it (Domański, 2012).

It is therefore not surprising that for decades now new conceptions of urban development and urban planning have been proposed and implemented that are intended, more or less clearly, to restrict mobility by proper development of the spatial-functional structures of cities (Mierzejewska, 2009b; Mierzejewska, Parysek, 2014; Modrzewski, 2012; Parysek, 2012, 2013). The conceptions that come to the fore here are smart growth, new urbanism, multi-functional intensive land use (MILU), and urban design. A new, different look at urban development is also presented in the New Athens Charter adopted in 2003 and in the Leipzig Charter recommended by the European Commission, which are supposed to 'improve' the existing urban spatial structures (Domański, 2012; Mierzejewska, 2009b, 2011; Modrzewski, 2012; Parysek, 2012).

The mobility of city residents, especially in the context of advancing motorisation, is often an object of studies, which are neither easy nor cheap to perform. The realisation that the knowledge of residents' mobility will help to improve the operation of the urban system, primarily through corrections in its spatial-structural organisation, stimulates

a search for models of urban spatial structures rational in terms of both, land use and people's mobility. A point of departure is often the intervening opportunities model proposed by Stouffer (1940), which accommodates relations between mobility, distance to places of goal accomplishment, and the spatial structure of a city. In Poland, models of this kind were proposed by T. Zipser in connection with his spatial decisions paradigm (Zipser, 1973, 1983; Parysek, 2006). The knowledge of residents' movements will allow planner to design such spatial structures and such communications networks and public passenger transport that will leave residents more free time after they have attended to basic tasks connected with household operation (work, education, care of children, shopping, various services).

An improvement in the functionality of the spatial system of a city resulting in declining mobility of its residents will also help to reduce the dynamics of the socially costly process of suburbanisation and the use of the car, an increasingly popular vehicle chosen for movement but also a source of many problems (congestion, road accidents, air pollution, urban sprawl, the necessity to build car parks, etc.). The present authors assume that one of the main criteria in the search for socially efficient solutions optimising spatial structures of cities should be time, and more specifically, free time at people's disposal. Modifications in those structures should therefore aim at making places of residence closer to places of goal accomplishment, as postulated by the recent urban-planning conceptions mentioned above.

### 3. In search of spatial solutions limiting the mobility of city residents

Not all of the various acceptable ideas, models or conceptions of urban development can help to reduce the spatial and temporal dimensions of the mobility of city residents when put into practice. Those that seem to offer the greatest hopes in this respect include smart growth, new urbanism, MILU, a compact city, and to some extent also 'a city for people' and urban design.

While the conception of urban development planning known as **smart growth** has generally

sprang from the desire to counteract current urbanisation trends, two of the fundamental reasons for the measures taken, viz. (1) growing construction and operation costs of urban infrastructure, and (2) deteriorating living conditions in cities, are also reasons for creating compact, well-organised and functional spatial urban structures. Such structures can help to restrict the mobility of residents, both in spatial and temporal terms (Table 1). The smart growth conception is intended to modify the modern urbanisation process by encour-

aging an economical use of land, a more compact building pattern, improved walkability to principal destinations, limited use of the car, preference given to public transport, etc. (Filion, 2003; Downs, 2001; Dale, 2003; Bourne, 2001; Braun, 2006; Braun, Scott, 2004). Smart growth, in the opinion of its proponents, will result in an attractive living environment in a city and will guarantee its balanced socio-economic and spatial development (Downs, 2001; Parysek, 2006, 2009, 2012; Mierzejewska 2009a).

**Table 1.** Ways of restricting the mobility of city residents found in selected modern ideas, conceptions and models of urban development

Conception, idea, model	Literature	Measures to restrict residents' mobility
Smart growth	Bourne 2001; Braun 2006; Dale 2003; Downs 2001; Filion 2000, 2003; Parysek 2012;	Economical land development, compact building pattern, better accessibility of places of goal accomplishment to pedestrians, limited car use, preference given to public transport
New urbanism	Duany, Plater – Zyberk & Speck 2001., Duany, Plater – Zyberk & Alminana 2003., Parysek 2012;	Human scale of urban units accessible to pedestrians, with diversified building pattern and well-balanced homes and workplaces; limited scale of mobility and time spent in means of transport
MILU – multifunctional, intensive land use	Allen i inni 2007; Mierzejewska 2009a; Parysek 2012;	Multi-functional and intensive land use to reduce car use and development of public transport network
Compact city	Mierzejewska 2009a;	Compact building pattern, high population density, efficient public transport, limited use of energy (fuel and electric energy of means of transport);
'City for people'	Gehl & Gemzoe 2004; Gehl 2010, 2011; Parysek 2012;	'Human' size of city, distances travelled on foot and by bike, and longer ones by public transport rather than private car
Urban design	Barnett 1982; Carmona & Tsiedell 2007; Larice & MacDonald 2007; Lunch 1960; Modrzewski 2012; Parysek 2012;	Public spaces as places of human activity, streets as skeleton of multi-functional urban tissue, creating urban transport systems improving access to places of goal accomplishment

Source: Own compilation

**New urbanism**, somewhat similar to smart growth, is primarily a new trend in urban planning and designing urban development. Its adoption is supposed to lead to the creation of new urban structures: accessible to pedestrians, with a diversity of building patterns and functions, a large offer of jobs, an open public space, and modern architecture suited to the functions of buildings. A synergic effect of measures taken in accordance with the new urbanism principles is supposed to be a balanced

development of the housing stock and workplaces that will significantly reduce the scale of people's mobility and the time they spend in the means of transport (Duany et al., 2001; Duany et al., 2003; Parysek, 2006, 2012).

New urbanism strongly emphasises the need to create human-scale urban units offering a well-balanced living environment in a city. Owing to their small size, such units will draw places of goal accomplishment closer to places of residence, at least



reducing the time that people spend travelling. The assumptions of new urbanism also include measures intended to counteract (1) an increasing dependence of people and households on the car, and (2) the separation of places of residence from the central parts of the city, its shopping and service centres, and other destinations (Duany et al., 2001; Duany et al., 2003; Parysek, 2012).

Also the **MILU** conception involves reconsidering the spatial-structural models of cities adopted. Planners should reflect primarily on the monofunctionality of urban areas developed, which makes it necessary to organise public transport and leads to an overuse of private cars as means of getting to various destinations dispersed all over a city. The factors necessary to implement the MILU idea include: (1) a growing awareness of positive (and negative) consequences of multi-functional, intensive land use, (2) checking the extent to which facilities can concentrate in an area in order to give it a spatial-functional structure proper in physical, economic and social terms, and (3) the choice of a strategy of multi-functional and intensive land use suitable for a concrete city. Multi-functional, intensive land use will help to achieve this goal (Allen et al., 2007; Mierzejewska 2009a; Parysek 2012).

A characteristic feature of a **compact city** is a high density of the building pattern with a small proportion of single-family houses (not only within the city itself, but also in its suburban zone). The goals this conception is supposed to accomplish are curbing the invasion of building onto free land, better accessibility of local services, and more efficient public transport, which can also mean drawing places of goal accomplishment closer to places of residence. This is facilitated by a high population and building density that allows reducing the distances covered and the time of travel between various functional areas, creating conditions for the development of an efficient public transport system. This conception also assumes lower energy consumption in the city that can be achieved by limiting the kinds of mobility which involve the use of means of transport consuming much energy (Mierzejewska, 2009a).

It is hard to establish when the idea of 'a city for people' appeared. It is probably as old as a human-centred approach to a city, its structure and function. However, the many publications describ-

ing such a city, its properties and creation were authored by the Danish architect and urban planner, J. Gehl. 'A city for people' is an urban settlement unit which is healthy, safe, lively, and highly sustainable (Gehl, Gemzoe, 2004; Gehl, 2010, 2011). Such a city should also be 'on a human scale', as expressed by people travelling distances on foot or by bike, and using public transport for longer distances, not the private car (Gehl, 2010, 2011).

**Urban design** is a set of practical measures the effects of which include: buildings, building complexes, whole neighbourhoods and districts, and especially public spaces in which people would like to live, work and enjoy themselves. To achieve those goals, people must operate in spatial structures that will allow them to gain some free time. Among the goals or tasks that this line of urban development planning is supposed to accomplish are: (a) organising public spaces as places where residents (and visitors) can live, meet and be active, (b) building a network of streets providing the skeleton of the urban fabric (organising the city spatially) and performing a variety of functions (residential, transport, commercial, meetings, recreational, cultural, etc.), and (c) creating urban transport systems (their organisation, structure, operation, accessibility, complementarity, better quality of service, lower operational costs, etc.). The accomplishment of each of those goals will lead to a reduction in the mobility of residents, although in varying degrees (Lynch, 1960; Barnett, 1982; Carmona, Tiesdell, 2007; Larice, MacDonald, 2007; Modrzewski, 2012; Parysek 2012).

As can be seen, each of the above conceptions, ideas, models or approaches to urban development assumes, whether directly or indirectly, a reduction in the mobility of city residents which is supposed to be achieved via the city's compact and multi-functional building pattern and preference given to people moving in pursuit of various goals on foot, by bike or public transport. In general, this means the need to create a spatial-functional structure efficiently maximising people's free time, and their limited mobility is supposed to contribute to it. This mobility, which is only partly an effect of the conscious choice of residents dictated by many factors, is primarily a consequence of the existing spatial structure of the city and its perception. It is therefore a task for planners to create spatial struc-

tures that will meet residents' needs while bringing places of goal accomplishment closer to places of residence.

#### 4. Mobility of Poznań residents

The mobility of city residents has lately been an object of some geographical research. Very often such studies are conducted to establish what public transport systems would be efficient or to determine the effect of motorisation on a city's spatial pattern, its development and operation (Sheller, Urry, 2002; Urry, 2004; Low, 2007; Newman, 2007; Conley, McLaren, 2009; Dennis, Urry, 2009). The Polish contribution to this type of research has so far been modest, which is probably due to its high labour intensity and costs (Wesołowski, 2003; Taylor, Józefowicz, 2012; Parysek, 2013; Parysek, Mierzejewska, 2013, 2014; Zajac, 2014).

Let us now present some aspects of the mobility of the residents of Poznań revealed in a study of their activity over time. It was impossible to determine the spatial dimension of their mobility, but from the point of view of the optimisation of free time that they can spend in a variety of ways – which is a measure of the formation of the city's efficient spatial structures – it seems more important to establish the temporal dimension of their mobility and modes of movement. This information was obtained in the course of a survey research carried out in 2012 and embracing 1,008 residents (aged 18 and older).

The choice of a way to reach the place of work, education and other destinations depends on many factors, e.g. (a) the distance to be covered, (b) the time necessary to travel a concrete distance, (c) the possibility of using public transport, (d) possessing a car (or other means of transport) and the possibility of getting to a destination (congestion in road traffic, parking possibilities), (e) the convenience of and attachment to the car, (f) the time and nature of work, (g) matters to be arranged before and after work/ school, (h) the existing system of bike routes, (i) the material situation and economic calculation, (j) health status, (k) weather conditions, (l) ecological awareness, and possibly still other factors. But the choice of one or another way of getting to a des-

tinuation seems to be mainly a resultant of the factors listed above (Parysek, Mierzejewska, 2013).

In the 2012 survey research, 49.1% of the respondents (58.0% of males and 42.2% of females) declared having a car. Car owners, understandably, were primarily young and middle-aged people. The car was used in a variety of situations which determined the frequency of its use. Everyday use was declared by 28.7% of the car owners questioned, people using it a few times in a week accounted for 22.3%. Even fewer people, 9.5%, drove the car only at weekends, but its sporadic use was the one declared most often, by as many as 39.4%. The car was a means of transport used for a variety of purposes, usually a combination of many goals accomplished between leaving home and coming back to it. Those were: shopping (17.8%), family life (17.7%), tourism and recreation (12.5%), work (10.6%), social life (9.5%), cultural life (7.5%), entertainment (7.4%), driving children to kindergarten and school (3%), and other purposes (Parysek, Mierzejewska, 2013).

As to the ways of reaching the places of work and education (Table 2), the largest proportion of Poznań residents, 23.1%, go to work, school and other destinations on foot. Next comes the tram, which is used by 20.7% of the respondents. However, they often find it necessary to use combined transport, e.g. a tram and a bus (15.7%), or a car and public transport, making use of park-and-ride facilities (4.1%). 15.5% of Poznań residents go to destinations by bus, while the car is a means of transport for 18.8%. An increasingly popular vehicle for moving around the city is the bicycle, even though it is used by a mere 2.1% of the respondents. Public transport to work, school and other destinations is the only means of travelling for a total of 52% of city residents, and it is preferred mostly by the youngest respondents (aged up to 25) and the oldest ones (over 65). This seems to be due to the financial situation of and discount tickets for people acquiring education and for pensioners, and to free rides for those over 70 years of age. A pedestrian route to work, place of education and other destinations is mostly chosen by females as well as the oldest and the youngest persons (20.4%). The tram is a means of transport primarily for the youngest and for females; the bus, for the oldest and the youngest; and the tram and bus, for the youngest. The car is mainly used by males and young people (up to 45)

as well as those more advanced in age (46–65). The bike is chosen by the youngest group (up to 25), young people (26–45), and males. It is not a means of transport of the oldest group.

**Table 2.** Poznań residents' ways of getting to places of work and education (2012)

Means of transport	Sex			Age			
	Total	Males	Females	Up to 25	Aged 26–45	Aged 46–65	Over 65
On foot	23.01	21.77	23.92	20.43	15.93	23.88	36.57
By tram	20.70	18.78	22.14	26.09	17.59	19.40	19.71
By tram – bus	15.72	15.37	15.95	19.78	16.67	13.43	11.14
By bus	15.54	14.69	16.16	18.26	11.30	12.24	21.71
By car	18.80	22.72	15.74	8.91	28.89	25.97	9.43
By car – tram/bus	4.09	4.08	4.09	3.04	7.04	3.58	1.43
By bike	2.14	2.59	1.99	3.48	2.59	1.49	0.10

Source: Own calculations on the basis of the results of a survey research

As has already been stated, of prime importance for a research on mobility is the time of reaching a destination and the time necessary to attend to various matters on the way to and from the chief destination (the place of work or education). To reach their basic destinations, 36% of Poznań residents need about 30 minutes, 31.2% – 15 minutes, 15.5% – 45 minutes, and 11.4% – about an hour. This means that within 15 minutes 34.4% of residents reach their destinations, within 30 minutes –

70.4%, within 45 minutes – 85.9%, and within an hour – 97.3% (Table 3). This time should be doubled for the return home, adding an extra hour for attending to various matters on the way (Parysek, Mierzejewska, 2013). 36% of car owners travel by themselves, 48.5% with another person, 9.3% with two, and 6.2% with three or more.

Taking into consideration the modal value, the everyday (weekday) mobility of Poznań residents takes them more than 2 hours daily and includes,

**Table 3.** Time in which Poznań residents reach their places work and education as well as other destinations (in 2012) – % of the total

Time (hours)	Weekday		Saturday		Sunday	
	In given time interval	Incremental	In given time interval	Incremental	In given time interval	Incremental
0 to 15 min.	3.20	3.20	15.50	15.5	20.45	20.45
15 min.	31.20	34.4	34.75	50.25	39.67	60.12
30 min.	36.00	70.4	31.21	81.46	26.86	86.98
45 min.	15.50	85.9	8.11	89.57	4.88	91.86
1 hr.	11.40	97.3	9.02	98.59	7.02	98.88
1 hr. 15 min.	0.50	97.7	0.10	98.69	0.10	98.98
1 hr. 30 min.	1.90	99.7	0.51	99.20	0.41	99.39
1 hr. 45 min.	0.00	99.7	0.10	99.30	0.00	99.39
2 hrs	0.10	99.8	0.61	99.90	0.61	100.00
2 hrs 15 min.	0.10	99.8	0.00	99.90	0.00	100.00
2 hrs 30 min.	0.00	99.8	0.00	99.90	0.00	100.00
2 hrs 45 min.	0.00	99.8	0.00	99.90	0.00	100.00
3 hrs	0.10	99.9	0.10	100.00	0.00	100.00

Source: Own calculations on the basis of the results of a survey research



apart from pedestrian traffic, the use of public transport and the car, or less frequently the bicycle. The time of their movement looks a bit different on work-free days. A reduction in mobility is advantageous for both, people themselves, as they will have more free time and save on travelling, and for the city authorities, as they will save on transport investment, road maintenance, and running the public transport system. The city will also be healthier, cleaner and safer (with fewer road accidents).

As follows from the numerical data presented above, attachment to the car and its use is one of the characteristic features of Poznań residents. Obviously, such an attitude generates ever heavier street traffic, additionally intensified by people living in the Poznań agglomeration who commute to the core city as a place of work, education, or providing various services.

## 5. Recommendations for planners

The mobility of city residents resulting from urban sprawl and a growing distance between places of

residence and those of goal accomplishment will not decline of itself. In the Polish conditions, the car is such a valuable good that resignation from its frequent use when moving around a city is not going to happen in the foreseeable future (Parysek, Mierzejewska, 2013). Therefore of special importance in curbing those two mutually reinforcing processes, i.e. growing mobility and urban sprawl (as well as suburbanisation), are measures taken by planners, in addition to a rise in ecological awareness and the development of public transport. Hence, in order to give this article also a utilitarian value, recommendations for planners are proposed. They can best be formulated in the form of principles that a spatial development policy should obey. Thus, in order to reduce the mobility of a city's residents as well as its operational and expansion costs, it is necessary for recommendations listed in Table 4 to be accommodated in a general conception of the city's spatial-functional structure (if such a document is supposed to be prepared), a study of the conditions and directions of spatial development (an obligatory planning document in Poland), and local plans of spatial development.

**Table 4.** Recommendations for planners concerning measures to restrict residents' mobility and arrest the spatial development of cities

Recommendations (steps to be taken)	Potential effects
1. Introducing new ideas, conceptions and models of spatial development of cities to planning practice	1. Development of city as spatially compact, multi-functional unit friendly to residents
2. Treating city as territorial social system	2. Holistic and functional approach to urban development planning
3. Adopting conception of compact and sustainable city in spatial planning	3. Making places of residence and those of goal accomplishment closer, restricting mobility and public transport
4. Adjusting locational and investment policies to conception of compact city	4. Limiting urban sprawl and suburbanisation, cutting costs of city development and operation
5. Urban renewal, especially in central parts of city	5. Supporting reurbanisation processes, animating city centres
6. Developing multi-functional units in city's spatial structure	6. Counteracting stratification, animating urban space, restricting mobility and development of public transport
7. Preparing selected plots of land for complex investment	7. Greater spatial order, multi-functional land development
8. Dispersed pattern of residential construction, diversified in terms of standards and architectural forms	8. Counteracting creation of monolithic spatial-functional structures far from the city centre, counteracting segregation
9. Creating functional, spatially accessible, integrated and cheap public transport systems	9. Limiting car use, reducing traffic and congestion
10. Building system of urban ring roads	10. Limiting transit traffic and its intensity in city, improving environmental;
11. Building pavements for pedestrians and bike lanes, eliminating barriers to movement on foot, giving preference to pedestrians at street crossings	11. Increasing proportion of pedestrian and bike traffic, restricting use of car and public transport
12. Introducing organisational and legal restrictions for wheeled traffic in city, persuading city resident to move on foot and by bike	12. Limiting car use, greater importance of public transport and movement on foot and by bike

Source: Own compilation

One of the conditions that may ensure the recommendations given in the table to be accommodated in urban development planning could be the restoration of general plans of the spatial development of cities that stopped being prepared on the strength of a law that came into force in 2003.

## 6. Conclusion

It is possible to adopt various preliminary assumptions when working on the spatial-functional structure of a city in the planning process. One of such assumptions can be the creation of a structure efficient in terms of the maximisation of free time its residents will have at their disposal. This type of structure will feature a compact and multi-functional building pattern and good spatial accessibility of destinations, which will reduce the mobility of the residents. While mobility is still an effect of their conscious choice of destinations and their perception of urban space, its basic factors will always be the organisation, internal structure and operation of the city as a whole, and the spatial accessibility of its elements. Such a spatial-functional structure is not only in the interest of its residents, but also its authorities, and this means general social interest. In the case of residents, this interest is measured in terms of more free time at their disposal and lower movement costs, and in the case of the city, lower costs of its operation and development.

Working out a model of such a structure and its implementation is a task for planners, who can make use of the research output as expressed in the latest ideas, models and conceptions of the spatial development of cities.

## References

- Allen, G., Carmichel, S., Dol M., Kempton, A. and Kramer, M., 2007: MILU Multifunctional Intensive Land Use. Principles, Practices, Projects and Policies. Gouda, Inc: The Habiforum Foundation.
- Barnett, J., 1982: An introduction to urban design. New York: Harper & Row.
- Billert, A., 2006: Planowanie przestrzenne a polityka. Trzecia droga do trzeciego świata (Physical planning and politics. A third way to the third world – in Polish). In: Ossowicz, T. and Zipser, T. editors, *Urbanistyka w działaniu. Teoria i praktyka*. Materiały II Kongresu Urbanistyki Polskiej, Warszawa: Biblioteka Urbanisty 9, pp. 240–253.
- Bourne, L., 2001: The urban sprawl debate. Myths, realities and hidden agenda. *Plan Canada*, Volume 41, Issue 4, pp. 26–28.
- Braun, G., 2006: Smart growth. The end of a good idea. In: Murayama, Y. and Du, G., editors, *Cities in global perspective, Diversity and transition*, Tokyo: Rikkyo University, pp. 79–93.
- Braun, G. and Scott, J., 2004: News from the urban front: dressing social innovation in urban and regional management. In: Pak, M. and Rebernik, D., editors, *Cities in transition*, Ljubljana: University of Ljubljana, Department of Geography, Faculty of Arts, pp. 15–26.
- Carmona, M. and Tiesdell, S., 2007: Urban design reader. Amsterdam: Architectural Press of Elsevier Press.
- Chojnicki, Z., 1989: Koncepcja terytorialnego systemu społecznego (A conception of a territorial social system – in Polish). In: *Przegląd Geograficzny*, Volume 60, Issue 3, pp. 491–510.
- Chombart de Lauwe, P.H., 1952: Paris et l'agglomération parisienne. Paris: Presses universitaires de France.
- Conley J. and McLaren A. T. editors, 2009: Car troubles. Critical studies of Automobility and Auto-Mobility. Burlington: Ashgate.
- Dale, G.C., 2003: Smart growth. *Planning Commissioners Journal*, Volume 50, spring.
- Dennis, K. and Urry J., 2009: Post-Car Mobilities. In: Conley, J., McLaren, A.T., editors, *Car Troubles. Critical Studies of Automobility and Auto-Mobility*, Burlington: Ashgate, pp. 235–252.
- Domański, R., 2012: Ewolucyjna gospodarka przestrzenna (Evolutionary spatial management – in Polish), Poznań: Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu.
- Downs, A., 2001: What does smart growth really mean? In: *Planning*, Volume 64, Issue 4, pp. 20–25.
- Duany, A., Plater-Zyberk, E. and Alminana, R., 2003: The new civic art: Elements of town planning. New York: Elsevier Rizzoli Publ.
- Duany, A., Plater-Zyberk, E. and Speck, J., 2001: Suburban nation: The rise and the decline of the American dream. Macmillan: North Point Press.

- Filion, P.**, 2003: Towards smart growth? The difficult implementation of alternatives to urban dispersion. In: *Canadian Journal of Urban Research*, Volume 12, Issue 1, pp. 48–60.
- Gehl, J. and Gemzoe, L.**, 2004: Public space – public life. Copenhagen: Danish Architectural Press.
- Gehl, J.**, 2010: Cities for people. London: Island Press.
- Gehl, J.**, 2011: Life between buildings: Using public space. London: Island Press.
- Goodall, B.**, 1987: Dictionary of human geography. London: Penguin Group.
- Jagielski, A.**, 1974: Geografia ludności (Population geography – in Polish). Warszawa: Państwowe Wydawnictwo Naukowe.
- Jałowicki, B.**, 1972: Miasto i społeczne problemy urbanizacji (The city and social urbanisation problems – in Polish). Kraków: Państwowe Wydawnictwo Naukowe.
- Jędraszko, A.**, 2008: Gospodarka przestrzenna w Polsce wobec standardów europejskich (Spatial management in Poland against European standards – in Polish). Biblioteka Urbanisty 13, Warszawa: Urbanista.
- Johnston, R.J., Gregory D., Pratt G. and Watts M.**, editors, 2003: The dictionary of human geography. Oxford: Blackwell Publishing.
- Korcelli, P.**, 1974: Teoria rozwoju struktury przestrzennej miast (Theory of the development of the spatial structure of cities – in Polish). Studia KPZK PAN, 45.
- Larice, M. and Mac Donald, E.**, 2007: The urban design reader. New York: Routledge.
- Low, N.**, 2007: The green city: sustainable homes, sustainable suburbs. In: Thrivatis, K. and Porta, S., Romice, R. and Graves, R. editors, *Urban sustainability through environmental desing*, London: Routledge, pp. 133–165.
- Lynch, K.**, 1960: The image of the city. Cambridge: MIT Press.
- Matykowski, R.**, 1990: Struktura przestrzenna Gniezna i przemieszczenia jego mieszkańców (The spatial structure of Gniezno and movements of its residents – in Polish). Poznańskie Towarzystwo Przyjaciół Nauk, Prace Komisji Geograficzno-Geologicznej, Volume 22. Warszawa–Poznań: PWN.
- Mierzejewska, L.**, 2009a: Rozwój zrównoważony miasta. Zagadnienia poznawcze i praktyczne (Sustainable development of a city. Cognitive and practical issues – in Polish), Poznań: Wydawnictwo Uniwersytetu im. A. Mickiewicza.
- Mierzejewska, L.**, 2009b: Urban planning in Poland in the context of European standards. In: Parysek, J., editor, Urban and regional development and planning, *Quaestiones Geographicae*, Volume 28, Issue B/1, pp. 29–38.
- Mierzejewska, L.**, 2011: Planowanie rozwoju polskich miast w świetle zapisów Nowej Karty Ateńskiej i Karty Lipskiej (Planning of the development of Polish cities in the light of the provisions of the New Charter of Athens and the Leipzig Charter – in Polish). In: Marciniak, K, Sikora, K. and Sokołowski, D. editors, *Koncepcje i problemy badawcze geografii*, Bydgoszcz: Wyższa Szkoła Gospodarki, pp. 331–344.
- Mierzejewska, L. and Parysek, J.**, 2014: Integrated planning of the development of a city in terms of the diurnal activity of its residents. In: Szymańska, D. and Środa-Murawska, S. editors, *Bulletin of Geography. Socio-economic Series*, Toruń: Nicolaus Copernicus University, No. 25, pp. 143–153. DOI: <http://dx.doi.org/10.2478/bog-2014-0035>
- Modrzewski, B.**, 2012: Urban design. Pojęcie i metody (Urban design. The concept and methods – in Polish). In: Parysek, J. editor, *Kształtowanie przestrzeni miejskiej: Aspekty teoretyczne i praktyczne*, Poznań–Kalisz: Uniwersytet im. A. Mickiewicza w Poznaniu, pp. 58–79.
- Newman, P.**, 2007: Travel time budget as a tool for sustainable urban design. In: Thrivatis, K., Porta, S., Romice, R. and Graves, R. editors, *Urban sustainability through environmental design*, London: Routledge, pp. 87–94.
- Ogden, P.E.**, 1984: Migration and geographical change. Cambridge, Cambridge University Press.
- Parysek, J.**, 2006: Wprowadzenie do gospodarki przestrzennej (Introduction to spatial management – in Polish). Poznań, Wydawnictwo Naukowe Uniwersytetu im. A. Mickiewicza.
- Parysek, J.**, 2009: Urban development in Poland after 2003. Legal regulations and reality. In: Parysek, J. editor, Urban and regional development and planning, *Quaestiones Geographicae*, Volume, 28, Issue B/1, pp. 39–48.
- Parysek, J.**, 2010a: Urban development policy of the European Union and the discretionary nature of Polish spatial planning. Part I. In: Churski, P. and Ratajczak, W. editors, Regional development and regional policy in Poland: First experiences and new challenges of the European Union membership, *Studia Regionalia KPZK PAN*, Volume 27, Issue 1, pp. 172–184.
- Parysek, J.**, 2010b: Urban policy in the context of contemporary urbanisation processes and development

- issues of Polish cities. In: *Journal of Urban and Regional Analysis*, Volume 2, Issue 2, pp. 33–44.
- Parysek, J.**, 2012: Współczesne miasta i problemy ich funkcjonowania i rozwoju (Modern cities and problems of their operation and development – in Polish). In: Parysek, J. editor, *Kształtowanie przestrzeni miejskiej: Aspekty teoretyczne i praktyczne*, Poznań–Kalisz: Uniwersytet im. A. Mickiewicza in Poznaniu, pp. 9–57.
- Parysek, J.**, 2013: Dobowa aktywność mieszkańców Poznania Diurnal activity of Poznań residents – in Polish). In: *Studia miejskie*, 12, pp. 9–34.
- Parysek, J. and Mierzejewska, L.**, 2013: Życie miasta. Studium Poznania. Miasto i jego mieszkańcy (Life of a city. A study of Poznań. The city and its residents – in Polish), Poznań, Bogucki Wydawnictwo Naukowe.
- Pickvance, C.G.**, 1973. Life–cycle, housing tenure and intra-urban residential mobility: A causal model. In: *The Sociological Review*, Volume 21, pp. 279–297.
- Sheller, M. and Urry J.**, 2002: The city and the car. In: *International Journal of Urban and Regional Research*, 24, 4, pp. 737–757.
- Stouffer, S.A.**, 1940: Intervening opportunities: a theory relating mobility and distance. In: *American Sociological Review*, 5, pp. 845–867.
- Taylor, Z. and Józefowicz I.**, 2012: Daily mobility of disabled people for healthcare facilities and their accessibility in urban space. In: *Geographia Polonica*, Volume 85, Issue 3, pp. 5–22.
- Urry, J.**, 2004: The system of Automobility. In: *Theory, Culture & Society*, October, 21, pp. 25–39.
- Wesołowski, J.**, 2003: Transport miejski. Ewolucja i problemy współczesne (Urban transport. Evolution and current problems – in Polish). Łódź, Wydawnictwo Politechniki Łódzkiej.
- Wlamsley, D. J. and Levis, G.J.**, 1984: Human geography, behavioral approach. London: Longman.
- Zajac P.**, 2014: Samochód jako wyzwanie dla miast XXI wieku (The car as a challenge to 21<sup>st</sup>-century cities – in Polish). In: *Zeszyty Naukowe 155, Inżynieria Środowiska*, 35, Zielona Góra: Uniwersytet Zielonogórski, pp. 84–94.
- Zelinski, W.**, 1971: The hypothesis of mobility transition. In: *Geographical Review*, Volume 61, pp. 219–249.
- Zipser, T.**, 1973: A simulation model of urban growth based on the model of opportunity – selection proces. In: *Geographia Polonica*, 27, pp. 119–132.
- Zipser, T.**, 1983: Zasady planowania przestrzennego (Principles of physical planning – in Polish). Wrocław: Wydawnictwo Politechniki Wrocławskiej.