

**University of Sopron
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Theses of doctoral (PhD) dissertation

**URBANISATION AND SUSTAINABILITY:
THE ECONOMIC, ENVIRONMENTAL AND SOCIETAL EFFECTS OF
URBAN FRINGE DEVELOPMENT**

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1. PROBLEM STATEMENT

Urban growth and urban development are globally defining phenomena in the formation of our environment. The pace of growth of built-up areas in greater city areas is attention-worthy and mostly means a problem in developing and developed countries alike. The European Union started putting more emphasis on the sustainability issues of uncoordinated urban area growth from the 2000s onwards. Urban sprawl characterises mostly the dynamically developing greater city areas and the Mediterranean seaside Southern European cities where conflicts, societal tensions, ecological aspects and economic (financial) questions resulting from the changes of land use and use of landscape urge the use of urban development management tools, the tightening of the legal environment and the spatial-level problem treatment.

The change of the urban fringe raises numerous research questions. The cityscape transformation of settlements is prominent, the residential area and economic development results in substantial changes in the character of urban fringes and in the urban landscape. International and domestic researchers focusing on the urban sprawl call attention to the negative effects of *not appropriately coordinated* urban sprawl endangering future resources, and recommend the measurement and monitoring of the sprawl, the crystallising of urban fringe policies, the tightening of the regulatory environment and the planning practice in this direction as well as the shift towards sustainable urban development.

The professions concerning domestic urban planning call for the spatial-level treatment of the problem as well. In the period following political transformation in 1990, the urban fringe transformation has been rather dynamic in the domestic mid-sized and greater cities due to global effects, privatisation, the compensation of land owners, the concentration of foreign capital in the urban fringe as well as societal changes.

As a result of the crisis of 2008–2009, it became one of the defining questions for the European Union development policy and urban development how a city can become the generator of the resources it uses, and how it can (even better) integrate the surrounding rural areas in the generation of resources. That means that the role of the reserve areas of the scarcely available urban fringe and the broadly defined urban-rural fringe is expected to appreciate in the future.

2. OBJECTIVES AND METHODOLOGY

The goals of this research are the exploration of the international and domestic literature on urban sprawl, the analysis of domestic sprawl processes and the various conflicts caused by suburbanisation and resulting from functional change as well as the investigation of the urban fringe policies coordinating domestic urban sprawl and that of the role of the urban fringe in urban sustainability. The latter research direction was formulated by the candidate relying on the concept of urban metabolism.

The dissertation examines the functional transformation of urban fringe areas, more precisely that of urban fringe area gardens. Further, it investigates the domestic characteristics and tendencies of urban sprawl, the attitude of settlements towards the problems of sprawl and the tools of domestic cities for curbing the sprawl. The candidate examined the processes of urban sprawl by placing it into an urbanisation cycle since the growth and spatial expansion of cities is to this day natural, connected to development and can so to speak be considered as an inevitable process. The population's needs constantly change through time due to the rise of economic wellbeing as well as globalisation and other effects.

The dissertation seeks for answers to the following questions:

1. How can the international and domestic researches concerning urban sprawl be assessed?
2. With what measurement methods can one identify sprawl and what main sprawl patterns do we know?
3. What main factors influence urban sprawl?
4. With what intensity is urban fringe transformation happening in Hungary following after 1990?
5. What transformation processes as well as land use and societal conflicts are generated in the urban fringes, in the urban fringe green belt areas and in the gardens by urban sprawl?
6. What directions and tools does urban fringe policy have; what characterises the domestic urban planning and urban development environment?

7. What is the problem perception of domestic urban chief architects regarding urban sprawl?
8. What role does the urban fringe play in urban sustainability?

Methodology applied during research

The candidate based the responses to the asked questions on the analysis of domestic and international literature as well as the results of case studies and that of the questionnaire survey conducted among chief architects.

The case studies and empirical researches mentioned throughout the study, on the one hand, identified the environmental and societal conflicts generated by intense land use change in the urban fringe (in the case of the settlements Biatorbágy – Budaörs – Törökbálint). On the other hand, they analysed the functional transformation of a particular land use category of the urban fringe, namely that of gardens, vineyards and fruit plots (in case of Virág völgy in Sopron).

In order to identify the domestic urban fringe policies, the candidate used the national questionnaire survey conducted among domestic urban chief architects in which she examined, through chief architects, the perception of problems occurring with regard to the sprawl. The aim of the research was to explore which are the most frequently applied tools to curb domestic urban sprawl, restrict the growth of built-up areas and regulate urban fringe transformation.

3. RESULTS OF EMPIRICAL RESEARCH

The research with the focus area Biatorbágy – Budaörs – Törökbálint revealed that the spatial transformative powers of the economy and the drastic effects of suburbanisation driven by the proximity of the capital city were signified in the rapid and often spontaneously occurring transformation of the fringe areas of the chosen case study settlements. Real estate development capital interests bore the most prominent landscape-forming influence but the space occupation of detached houses and the transformation of the garden areas were also defining with regard to the image and land use of settlements.

The transformation is loaded with conflicts which are critical mainly in societal, environmental, landscape and sustainability aspects. The residential intensions often clash with the interests of the municipality; the

population growth of external areas and gardens imposes tremendous infrastructural, institutional development and maintenance costs on settlements.

The urban fringe transformation of agricultural areas is to be examined both from the aspect of urban metabolism processes as well as sustainable urban operation and food supply. Both investigation sites proved suitable for the examination of the transformation process of previously so-called “enclosed gardens” and recreational areas into built-up areas and the conflicts triggered by transformation. However, the second case study examined the urban fringe transformation of gardens more concretely.

In the case study of Virágvölgy as the traditional garden and recreational belt of Sopron, the study presents the functional transformation of gardens, vineyards and fruit plots and the spread of residential function by using the results of remote sensing techniques and on-site field visits. Based on these, it could be determined that the garden is in an advanced state in transforming into a suburban residential belt. The intense pace of urban growth has a negative impact on the area, specially on the formation of traditional land structure and landscape. With the classification as a built-in area, the city depletes the areas with a favourable location that are suitable for gardening and viticulture. The deployment of the necessary infrastructure imposes an enormous burden on the municipality in the future.

The change of land use, especially in the period following the political transformation, occurred as a result of residential suburbanisation and urban sprawl. In the abandonment of vineyards, the compensation process following the end of Communism and the ownership real estate speculation both conspired.

With regard to horticulture, the ratio of ornamental gardens and recreational gardens has drastically increased in the past 15 years. The decline of viticulture seems to have halted following the millennium which may also be due to the development of the local wine culture. The foodstuff produced in the garden does not reach the local market; the cultivators of the gardens produce for their own families. The ratio of abandoned areas is rather large which impairs the landscape and is a source of conflict among locals.

The third empirical research of the dissertation was conducted among the chief architects of agglomerating and less agglomerating domestic cities.

In the vast majority of the inspected cities, the size of built-up areas grew following the political transformation in 1990, regardless of the tendencies of the settlement's population changes. The inclusion in built-up areas mostly happened for the purposes of greenfield investments and infrastructural developments; at the same time, the parcelling of municipal areas for wealth acquisition purposes among the less agglomerating settlements was defining. The legalisation of spontaneous vacation processes and the settlement of vacant areas was less motivating, and the inclusion in built-up areas for the purpose of increasing the areas not intended for building-in was even less typical. The building-ins contributed to the urban sprawl to a large extent in suburban residential areas and economic/industrial areas.

The problem perception of the surveyed chief architects varied as a function of the settlement's agglomeration. In the agglomerating settlements, the sprawl and the relatively more severe problems of the lack of green surfaces and the decline of the inner cities appeared with great emphasis besides traffic problems. In the lives of non-agglomerating cities, unemployment, population decline, population aging and the severity of ethnic and minority societal tensions meant a proportionally much greater problem.

Upon the examination of the problem perception with regard to the urban fringe and the urban sprawl, the traffic and transportation-organisation difficulties that generally afflict settlements were unambiguously outlined. In the eyes of the surveyed chief architects, the landscape and cityscape protection and nature protection problems caused by the sprawl were substantial. The functional change of agricultural areas was seen as a more severe problem by the chief architects of non-agglomerating settlements. In the newly built-up areas of the settlements, undeveloped cityscape, low institutional/commercial endowment and the lack of public transportation were typical, while flood threat, utility endowment and the lack of reserve areas was less of a characteristic.

The majority of chief architects acknowledged that the built-up area growth of settlements has to be limited; at the same time, they thought to a lesser extent that "the land use of detached house belts and suburban areas is wasteful". The majority of chief architects agreed that the development of the built-up areas of cities can contribute to slowing the pace of the sprawl and that, with the tools and regulations at hand, they can stop the urban sprawl; however, they also admitted using these tools less

in practice. Beyond the provisions created for the protection of the cityscape, the most frequently used measures were the restriction of built-up area spreading and the passing on of development costs to investors. The spatial-level treatment of the problems – despite the fact that a substantial proportion of agglomerating settlements thought of this is spatial-level issues) – was in practice hardly implemented.

4. THESES

1. The investigation of urban sprawl

The research on urban sprawl in international literature is rather extensive due to the intensive and global nature of urban areas, the extent of the harmful effects of the sprawl as well as the prioritisation of sustainability aspects. Besides international literature, the need for the exploration, measurement and restriction of urban sprawl processes is increasingly appearing in development policies too.

In domestic literature, the issue of urban sprawl mostly appears in connection with the examination of residential and economic suburbanisation; the studies concerning urban sprawl usually refer to the area of the capital city's agglomeration and the area of bigger cities. The sustainability approach is also present in domestic literature. The number of examinations from the viewpoints of urban metabolism and supply belts will expectedly grow in the future, partially thanks to the development policy of the European Union.

The measurement, comparability, mapping and monitoring of urban sprawl appears with great emphasis in international literature. The measurement methodology with which the different patterns of the sprawl can be analysed is, for the time being, not unified, and its basis is built on mainly geographic information databases and internationally available statistics. The 2016 report of the European Environment Agency (EEA-FOEN 2016) is based on the measurement methodology developed by Jeager-Schwick (2014), which, regarding European countries, explored the areas most affected by urban sprawl. The *WUP index* typical of the given region is largely dependent on the ratio of built-up areas, the number of residents and workplaces per the built-up areas, i.e. the intensity of the use of the area.

The domestic adaptation of the measurement methods known from international literature is in the initial phase.

2. The process of urban sprawl

2.1. The urban fringe is the scene of constant transformation, change of function and real estate speculation. In the lack of fully developed urban development ideas, urban fringe transformation often leads to the substantial and irreversible change of the urban landscape. Beyond environmental aspects, the infrastructure development pressure on urban management is also significant.

As a result of urban sprawl, the settlement morphology changes, mainly in the urban fringe areas; this is usually the outcome of greenfield industrial, commercial and service as well as residential investments and the related infrastructure developments. The function change is more intensive on the fringe of the cities of greater city areas, in which the spatial transformative power of working capital plays a defining role. The intensity and the problematic nature of urban sprawl is related to the extent of agglomeration typical of the given city.

2.2. In domestic regions, the tendency of sprawl is increasing and higher when compared to the average of EU countries, which can be mainly attributed to the strong growth of the Central-Hungarian and the West-Transdanubian regions as well as the low land-take intensity of West-Transdanubia. In European context, the urban sprawl is a moderately severe problem in our country, which occurs primarily in greater city areas and prominently in the capital city's agglomeration.

In the vast majority of domestic cities, the built-up area as well as the size of urban areas grew after 1990, irrespective of the tendencies of the settlement's population changes. Considering the domestic greater cities, the intensity and nature of urban sprawl varies. In the city centre's agglomeration, the urban fringe transformation occurred rather spectacularly and intensively as a palpable effect of suburbanisation processes; in rural cities, the sprawl was substantial mainly in the settlements affected by the impacts of agglomeration.

In the transformation of domestic fringe areas, a fairly great role was given to the spatial transformative role of the economy, the intensive processes of suburbanisation and the changes in the land market following the end of Communism.

3. The conflict fields of the urban fringe

3.1. Urban sprawl triggers numerous environmental, land use and societal conflicts which are critical from a sustainability perspective; the formulation of appropriate regulation is urgent.

The urban sprawl as well as the transformation of the urban fringe is a complex process loaded with conflicts whose main conflict fields can be classified as follows:

1. The function change of urban fringes and the resulting conflicts caused by land use changes

- 1.1. Decrease of agricultural areas;
- 1.2. Transformation of vineyards, fruit plots and gardens into urban residential areas;
- 1.3. The transformation of the relations between urban and urban fringe areas.

2. The appearance of urban characteristics in rural spaces

- 2.1. The land use of rural spaces bears ever more urban traits;
- 2.2. The rural, village-like areas of the rural hinterland contribute to the food supply of the urban belts to an ever-decreasing extent; the ability of self-sufficiency is decreasing.

3. Societal conflicts

- 3.1. Among residents using the area (old-new residency)
- 3.2. Gentrification and segregation triggered by urban rehabilitation;

4. Environmental conflicts

- 4.1. Increasing environmental burden, environmental pollution;
- 4.2. Environmental issues originating from artificial surface coverage;
- 4.3. Changes in landscape, environmental issues, change of landscape and cityscape.

5. Transportation/Traffic conflicts

- 5.1. Urban fringe expansion generates an ever-greater use of cars;
- 5.2. In the case of urban fringe investments with a residential function, the existing transportation infrastructure may become insufficient.

6. Economic conflicts

- 6.1. The land prices of the urban fringe real estate market exceed the ground-rent, so the urban fringe transformation, in the lack of appropriate regulation, is shaped by capital interests and profit maximisation; this leads to the depletion of public goods;

6.2. The support of residential and economic suburbanisation lies in the interest of municipality councils which, due to the increasing infrastructural demands, also mean a great burden in the end.

7. *Regulatory conflicts*

7.1. Inter-settlement conflicts;

7.2. Spatial conflicts (e.g. capital city's agglomeration);

7.3. National-level conflicts, legislative anomalies, effects of sectoral policies.

3.2. Gardens form a particular segment of the urban fringe which, in the lack of appropriate protection and regulation, may become the target of residential suburbanisation due to their appealing environment or that of economic suburbanisation due to their favourable location. The uncoordinated and wasteful urban expansion depletes the cities' areas suitable for agricultural production, their gardens, vineyards and fruit plots, transforming the townscape and the surrounding landscape. As a result of urban sprawl, the land use change and functional transformation in gardens can take on significant dimensions. For the settlements, gardens mean also mean reserve areas for later expansion; therefore, appropriate regulation is unavoidable.

The compensation process following the political change in 1990 as well as ownership real estate speculation played an important role in the abandonment of gardens and vineyards. Both the obligation for reclassification of enclosed gardens and the raising of the extent of site coverage contribute to the acceleration of the functional change of enclosed garden estates and they increase real estate speculation. The functional change of recreational areas with a residential purpose, in the lack of appropriate regulation, produces processes similar to those of gardens thanks to spontaneous processes and real estate speculation.

4. Urban fringe policies

The judgement of the urban sprawl is ambivalent, i.e. it simultaneously means the path of development and the depletion of resources for settlements. The restriction of urban sprawl requires a long-term perspective which can hardly prevail in economic systems of profit maximisation of capital and professing the maximisation of individual utility. The protection of green surfaces and agricultural areas in the urban fringe is a community interest that cannot neglect consequent and strict regulation. It can

be stated, therefore, that the role of the government and local municipalities is substantial in the determination of the pace, extent and direction of the urban fringe transformation/urban sprawl and, therefore, in the securing of sustainable urban fringe transformation.

In the domestic urban planning practice, the application of tools restricting urban sprawl fall behind the Western practice. According to the results of empirical research, chief architects see the treatment of urban sprawl as a mainly settlement-level task; in the case of the more heavily agglomerating cities the demand for spatial-level treatment is more palpable. However, to this day the appropriate spatial-level practice has not been formed in the country apart from the provisions of the capital city's agglomeration law.

The problems characterising the new built-up areas of domestic cities prove that in suburban belts the presence of service and commercial sector is typically low; there are few institutions (schools, kindergartens, health care/social institutions) which enhance the use of cars and the related harmful effects. In the case of new residential areas, I recommend the prioritisation of multifunctional land use primarily because of sustainability aspects.

The settlement-level, spatial-level and national-level regulation of the functional transformation of gardens, vineyards and recreational areas is low, and often their illegal occupation is not sufficiently controlled. The loosening of the concerning legal environment (simple notification obligation, the reclassification obligation of enclosed gardens) further reinforces these processes. For the founding of the legislations restricting the transformation of domestic gardens, I find the national-level and settlement-level assessment of gardens as well as the creation of a digital map database of the gardens owned by the local municipalities important.

5. The future of the urban fringe

Based on the current tendencies of the urban fringe transformation and the future prognostics of urbanisation, the transformation of the urban fringe land use will intensify which, in the case of inappropriate planning, may have a negative impact on the long-term sustainability and liveability of the city.

From the aspect of the urban metabolism concept, urban fringes bear a defining importance considering the decrease of inputs and outputs as

well as the increasing of urban liveability. The development policy of the EU assigns an ever-greater role to the urban fringe in the securing of local resources, the generation of locally produced foodstuff and through that local economic development, the spreading of short supply chains, the gaining of independence from global supply systems and the more sustainable operation of the city; altogether, in sustainable urban growth.

The strengthening and validation of urban metabolism in the urban fringe is impossible without the appropriate cooperation of the various levels, the elaboration of different strategies and concepts, the appropriate coordination of the activities necessary for implementation and a change in attitude and approach. The assessment of metabolism on the level of cities as well as the elaboration of various strategies which increase the contribution of the urban fringe to the urban metabolic processes is recommended based in international examples. In these strategies, the role of urban fringe gardens has to be determined which can be food supply, maintenance of the populations' wellbeing and health, securing of green surfaces or filling of the role of reserve areas.

Based on future sustainability and ecological aspects, it is important that the peripheral gardens, as the long-term reserve areas of cities, are given greater attention and that the long-term preservation of these via local regulation is secured. The role filled by the city-supply belt in the urban metabolism can be strengthened through the supporting and cooperating presence of the government, the local municipalities and civil organisations as well as through the use of available development funds and a change of attitude and approach of the residents.

5. THE NEW NOVEL FINDINGS OF THE RESEARCH

The novel results of the dissertation are the interpretation and presentation of the problem and treatment of urban sprawl in a domestic context based on international literature, as well as the interpretation of urban fringe transformation caused by urban sprawl from the urban metabolism aspect.

Another novel result is the analysis of a special segment of urban fringe transformation, namely that of the functional change of gardens. The new results obtained through the case study of Virágvölgy in Sopron may provide information for the settlement planning and operation management on the local level, and they provide a generalisable conclusion guidance

for the urban fringe policies. Yet another novel result is the analysis of domestic regional urban sprawl processes through the analysis of the regional level *WUP*, *LUP*, *DIS* and *PBA* values referring to 2006-2009 that can be found in the EEA reports (2006, 2016) and in the EIONET database. Based on this, it can be stated that Hungary is in the mid-range in terms of urban sprawl; the average is mainly increased by the data of the capital city's agglomeration.

One of the most important results of the research is the information obtained through the exploration of the problem perception and problem treatment of domestic chief architects regarding urban sprawl, together with the conclusions drawn based on said information. The problem perception of urban sprawl has not been examined in such manner in domestic literature until now. The results fill the gap for theoretical and, mainly, practical experts focusing on domestic urban development since they can offer a starting point for the formation of settlement-level and spatial-level regulatory tools.

6. RELEVANT PUBLICATIONS

Reviewed journal articles

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