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Opportunities and Constraints of Land Management in Local and Regional Development

Integrated Knowledge, Factors and Trade-offs

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Introduction

Spatial planning predicts and decides on future land use, also allocates activities across regions and develops adequate processes to coordinate these activities including implementation-sequences. Land management, in comparison, can be understood as the work related to the use of land resources within policy guidelines and the legal framework for a specific land area (Mattsson and Mansberger, 2017). Land Management is normaly embedded in a complex legal context, which frequently consists of contradictory objectives. Also, land management is a process that comprises coordination of activities while managing the use and the development of land resources. Thus, it can be bounded by the specifications resulting from spatial planning process and it sets new basics in spatial planning at the same time. The legal framework (including spatial plans) restrains the land management. However, the legal framework often contains generally formulated concepts and open standards, which unlock the range of opportunities for new objectives. It is important, if and how both, constrains and opportunities, are recognised by the actors. Interdisciplinary and cross-European knowledge exchange is a key activity of the European Academy of Land Use and Development (EALD). This volume shares the knowledge gained, in relation to Land Management opportunities and constraints, the identification of factors, which normally influence land use decisions, and the trade-offs produced by the selected activities. The monograph is based upon the peer-reviewed academic papers presented at two EALD symposia. The first symposium held was on the topic of "Infrastructure Projects and Land Management" in Ljubljana in 2016, whilst the second one on the topic about "Opportunities and Limits of Land Management in Spatial Development Processes" in Paris in 2017.

In the first section of this monograph, the authors discuss some basic problems in promoting mutual understanding between researchers and the general public as well as among scientists of different disciplines. They offer different approaches on how problems of inter- and transdisciplinary decision-finding could be bridged.

De Vries takes up the fact that current migratory patterns and demographic changes impair living conditions of rural regions. The author discusses the real and alternative land management instruments, which can be offered to rural and urban regions. For scientists it is necessary to understand and to compare what citizens and what government aspire when they execute and pursue rural development. Herefore, data were derived from two consecutive workshops in Munich. An additional literature review acted as heuristic way to reflect on theoretical paradoxes and rationalities. The third stage interprets the findings through a discursive and hermeneutic reasoning.

Discourse is also a theme in the paper of *Ortner et al.* Both, implementation of practical measures as well as recommendations on future spatial development can only be done if first spatial structures are valuated. The authors investigate how this issue is addressed in different

fields of research and search for common criteria used in the different spatial concepts of Geodesy, Spatial Planning and Geography. This enables detecting the required parameters which influence the location and in consequence the relevance of land value. An analysis of international research papers was undertaken in order to gain a comprehensive understanding of the concepts. The authors are certain that consideration of differences between the scales used within the disciplines can help to fill knowledge gaps in the analysed concepts.

Ekbäck's historical analysis on expropriation and protection of property gives an overview of the legal development of expropriation and protection of property in Sweden. The author discusses that the ownership is a complex construct, however it has been confirmed that looking at differences in the real content of ownership by studying the bundle of rights related directly to the land is a useful analytical tool for longitudinal, as well as cross-national, comparisons of land ownership and other real property rights. The research outcomes state that the reinforcement of the institution of property protection calls for a strengthening of the institution of expropriation. In contrary, it has been shown that a reduction of ownership rights do not necessarily predict a weakening or a decline of the legislation on compulsory acquisitions.

EU is funding trans-national research and education programs to enable academic partnership, staff and student mobility as well as capacity building. *Mansberger and Seher* reflect their experiences from three capacity-building projects on the topic of land management, in which the authors are currently involved. These projects are analysed in terms of administrative, methodological and thematic aspects. Opportunities and limits of methods applied are evaluated against the background of the respective project objectives. The authors provide recommendations for successfully operating such knowledge exchange projects.

In a cross-country comparison between Latvia and Germany, *Auziņš and Köhler* explore the cause-effect relationship between land fragmentation, multi-functionality and site development in incremental urban development. Consideration for the land fragmentation as well as stakeholders' interests to keep the multi-functionality of land (agriculture, forestry, natural protection, transport, housing, industries, etc.) would improve the implementation of urban development and reduce implementation-caused negative effects. The authors call for a better cooperation between planners and developers, to avoid externalities during the implementation of spatial development plans and to improve the specification of measures at an institutional level, to establish a more beneficial, overall synergy between the parties involved.

In the next set of papers authors refer to success requirements of land management instruments:

Klein et al. investigated the issue of costs in a paper that looks at cities where subsidies and funding of social housing are not sufficient to acquire reasonably priced housing for a threshold categorised household. Although revitalisation of derelict land has a high potential to solve this problem, it is crucial that the high number of stakeholders with very different interests, possess good cooperation and transparency. Moreover, derelict land holds high

risk and costs while realising affordable housing will decrease the revenue. The researchers recommend funding of unprofitable costs in combination with other financial and land-policy instruments.

The study of *Köhler et al.* turns towards quantifying spatial spill over effects of urban restructuring by testing the usability of several regression models, to quantify the scope and the spatial distribution, with the aim to use this for the value capture process. The authors carried out a quasi-experiment investigating the impact of different revitalisation measures, where the distance is considered to be not the only determining variable, but accompanied by the type of neighbourhood as a factor. Developing such methods help increasing urban redevelopment instead of development. Usability of the models regarding the spill over effects is discussed in detail and the problems are named, which must be faced in application.

Schindelegger aims to clarify the regulatory framework concerning relocation households located in hazard prone zones to reduce flood risks in Austria. Presently structural defence systems are no longer prioritised in flood risk management, but instead integral solutions combining different measures are favoured. Therefore, the relocation of the households located in hazard prone zones regains importance. In this context, the role of spatial planning in securing flood retention and run-off areas is portrayed in case studies. Organisation of the process and coordination of the stakeholders are the crucial elements for effective relocation, followed by the importance of compensation payments and a sufficient legal framework.

Jenny gives an insight into the preservation and maintenance of the industrial heritage sites. Respecting the cultural significance, whilst simultaneouslysatisfying various community needs, requires detailed municipal building legislation. The rules in question should consider the superior national and cantonal inventories of the site and monument protection, and create spatial planning requirements for the continuation of the existing and planned uses while preserving the historic buildings. Adaptive and careful use of the old buildings is necessary for the long-term preservation, in conjuction with the account for thetypes of use designated to preserve their inner substance.

To improve the environment as well as social and economic aspects, streets of Kaunas city centre were turned into pedestrian zones. *Dičiūnaitė-Rauktienė et al*. analyse the environmental criteria for pedestrian zones and discuss the importance of these criteria. The information gathered is examined using content analysis and synthesis methods of scientific publications. The observation has shown that noise level in Kaunas city pedestrian zones exceed limit levels and the concentration of air pollutants significantly increases. Combining the results of the study, leads to the recommendation of adopting municipality-strategies to reduce emissions.

Petrakovska and Kuznetsova discuss in their paper if town fringes could be designated as special zones. This contribution is an analysis of contemporary theoretical and practical characterisations of peri-urban territories. To fight against “unplanned” urban sprawl, the authors searched for a definition, which would have allowed to better address these areas in

spatial planning. They found that particularities of land use in peri-urban areas can only be explained by its functions, whereas boundaries resist delineation and stay dynamic. The challenge is to ensure that peri-urban development is driven not only by city-centre interests, but rather by the multitude of land use interests in town fringes, because maintaining multifunctionality is the crucial point in these areas.

Trehub and Trehub systemize in their paper the groups of factors with the greatest influence on the sustainable industrial land use in Ukraine: location, geology, engineering geology, as well as economic, ecological and planning issues. Contrastingly to other countries, the different Ukranian planning levels presuppose alternative types of documentation. The content of the factor groups is examined for all three levels: national, regional and local. Each of the factors has an influence on the choice of areas for the development of industrial zones, but further research is needed to numerically indicate and weigh their influence in comparison to the rest of the factors with respect to the sustainable development of industrial territories.

Lessons can be learnt from bad experience caused by land use changes. The following three contributions give a critical look on project-impacts and the role of the responsible government.

Industrial buildings gradually lose their functionality. *Yılmaz and Tüfekçioğlu* present a case study of the use of industrial buildings in cities and the role of local authorities. In the examined circumstances there was a gap between the priorities of local governments on one hand, and modern awareness of urbanisation and urban cultural policies on the other. To safeguard monumental structures as an integral part of the collective memory and urban identity, and to prevent malpractice by rent-seeking concerns, regulations should be enforced, with protection and registration decisions made obligatory and legally binding.

Keleş et al. report from a large area named Atatürk Forestry Farm. It was donated to the people of Turkey in 1937, with the condition of using the land as a recreation area, agricultural land and for husbandry; however, parts of the land were used outside its establishment purposes. During the last 15 years the land was systematically removed from public property and turned into a construction area, even though it is protected by special legislation. The authors discussed the reasons for the land value-loss and found a common conclusion that the responsibility falls on the central government, local government and citizens for allowing land use changes.

Iscioglu and Mengi discuss the negativities of mega-projects on land use, with the third airport project in Istanbul serving as an example. The authors chronicle the construction project of one of the biggest airports in the world, where the construction area is even much larger than needed. Furthermore, the assessment procedures of the real estate were accelerated by using the method of rapid expropriation decision. The build-operate-transfer models of the framework of public-private cooperation are criticized for not preventing the public interests, affecting the economic, social and ecological structures of Istanbul, and favouring sealed and uncontrolled tender processes.

Land management and property rights have a close relation. Urban planning objectives are often limited by compensation-costs. On the other hand, costs might be covered by absorbing value increase. Criteria for public indemnification is the topic of the subsequent papers.

Šubic Kovač takes a closer look at the acquisition of land and the compensation regarding infrastructure projects in the republic of Slovenia. In this study, the link to the constitutionally guaranteed private property had to be stressed. Two issues are in the foreground: Do the existing procedures suffice for the timely acquisition of land for construction and what causes are essential for inadequate compensation determination of land? The author argues for a special law for the cases, where public roads cross privately-owned land, as well as for a comprehensive regulation in the field of individual real estate valuation.

Petrakovska and Mykhalova examine the factors, which play a significant role in the decion making of compulsary purchase in Ukraine. It has been recognised that the level of provision of engineering and the transport infrastructure are two of the key factors predetermining sustainable development of the cities. The degree of influence on decision-making is analysed for different groups of factors: functionally-planning, economic, administrative-legal, social, natural and environmental. The analysis is given on three spatial levels, where land use decisions are taken: municipality territory, set of land plots foreseen for construction, and individual parcel from the perspective of the land owner. The specific characteristics of the third and thus the smallest level trigger compensation cost, which in turn has an impact on the decision-making process on the track layout of the infrastructure.

Auziņš gives an overview of the Latvian experience in covering development costs and absorbing value increase instead of passing it at the expense of the public. The author explores the institutional framework, as well as land use planning, development practice and land value capture. Land value capture can be used for specific purposes, namely as to find equity solutions in implementation of infrastructure projects. The analysis of the competence of local authorities and the spatial planning system, identified direct and indirect models for absorbing the surplus value of developed land. The interim conclusion for Latvia can contribute to an extended study and a comparative cross-national research.

Hervet looks at how the revenue is shared between the parties involved in residential mega-projects in Istanbul. The background of the article involes the deregulation of land policies in Turkey. As part of this process the Mass Housing Administration gained more decision-making permissions. Moreover, added land value produced by selling public land combined with the allocation of building rights is shared between investor and property developer. The state redistributes income from land privatisations into urban economy. This operating model has proved to be optimal for rapidly producing buildable land and new homes. However, the model favours brand residences instead of social housing.

Spatial data is a basic prerequisite of land management measures. However, providing geodata-based information can be very costly. The finishing three contributions deal with low-cost methods to support land management consisting of an area data of sufficient quality.

Pődör and Nyiri Mizsei investigate whether crowdsourced environmental noise measurements can be used for land management purposes. During the research, noise mapping tests were carried out with the mobile phones to detect noise levels at various locations and hence establish urban areas with high risk of environmental noise. The results initially indicated an anomaly, which showed that different mobile phones can produce different results. The accuracy also depends on the software used in the mobile. However, as the accuracy of measurements diverge, they can be used to detect noisier and quieter points within the same place. Following the notion, the method can be applied to reveal problematic areas where high quality noise measurements should be acquired.

Steensen and Schaffert attempt to bridge the inherent limitations of the free of charge geodata called OpenStreetMap and satellite based information. The authors use a multi-data-approach, merging the advantages of both information sources. The researchers present a workflow for combining OpenStreetMap data with a high level of thematic accuracy, but having lack in completeness, with Sentinel-2 data of high coverage, which lack of surface recognition due to atmospheric cloud shadows. The symbiosis of the two data sources shows promising results and the automation of the approach is still given resulting in products in a timely fashion and of good quality.

Germany's statistical offices only provide population data for administrative units. The paper of *Schaffert and Höcht* shows that municipal population data that are suitable for answering questions of rural development needs more detailed information. The fact that population registers of municipalities store demographic attributes of residents together with their addresses, can be used to fill the data gap and to satisfy the need for describing the spatial dimension of demographic change even on the local level. Case studies from rural areas illustrate the advantages that derive from analysing this data source by the means of GIS.

Erwin Hepperle
Vida Maliene
Jenny Paulsson

Reference

Mattsson, H., Mansberger, R., 2017. Land governance / management systems – a conceptual discussion. In: Hepperle, E. et al. (Eds.), Land Ownership and Land Use Development – The Integration of Past, Present, and Future in Spatial Planning and Land Management. Zürich, vdf Hochschulverlag, pp. 13–24.

Walter Timo de Vries*

Opportunities and Limits of Making Regions both Lucrative and Attractive

Abstract

Rural regions are under stress given current migratory patterns and demographic changes such as aging population. Land managers need therefore to design new solutions which make rural regions both 'attractive' and 'lucrative' alternatives to urban regions. The core question of this article is how this can be done. The approach to this question is threefold, learning from practice, learning from theory and synthesizing through discursive and hermeneutic dialogues. From a practical point of view the challenges and root causes for demographic changes are connected to the requirements for regional identity and pride. This is substantiated with data derived from representatives of governments and municipalities of Bavaria in Germany. From a theoretical point of view, several theoretical paradoxes and rationalities are addressed. Based on these first two sections, the third step is to interpret through discursive and hermeneutic dialogues: between theory and practice, between urban and rural regions, and between politicians and citizens. The conclusion section reflects on these dialogues and comes back to the key research question, namely whether and how regions can be 'attractive' and 'lucrative' at the same time.

1. Introduction

Rural regions are facing dramatic socio-economic changes and as a result of that land managers are challenged to come up with alternative solutions. In times of ongoing urbanisation and continued demographic changes in rural regions, new solutions have to be 'responsible', 'fit-for-purpose' and 'smart'. One of the key questions hereby is whether rural regions should be seen and managed like urban regions, and thus become as 'attractive' or as 'lucrative' as their urban counterparts? Addressing this question requires both a view on how land management interventions can contribute to change (hence an ontological question what land management interventions entail) and a view on which land management interventions can be compared and valued (hence a normative question how and why we should intervene).

For the first issue, de Vries (2016b) defines the activity of land managers as a set of interventions (or changes) in current people-to-land relations, which can be depicted as ΔLM, whereby ΔLM is a function of (or otherwise: depends on, or, yields) the respective changes in governance, law, social-spatial relations, economic opportunities and dependencies, perceptions and beliefs and behaviour. In short form:

ΔLM (Land Management) = f (ΔG, ΔL, ΔS, ΔE, ΔP, ΔB).

* Technical University of Munich, Chair of Land Management/Germany.

The question of whether to address rural regions as attractive or lucrative is zooming in to this basic relation, namely by focusing in particular on the changes in social-spatial relations (ΔS), economic opportunities (ΔE) and existing perceptions (ΔP). The changes are both objective, observable changes (by maps, statistics, cost/benefits), as well as subjective changes (in perceptions, self-reflections, images). Hereby the interactions between actors play an important role. The actors in land management in rural regions include all agencies at levels of the government and politics; agencies and social groups which deal with rural development; scientists and professionals engaged with land management, spatial planning, regional and rural development and land surveying. While they interact they all have certain preconceived images and perceptions on rural areas.

For the second issue (that of valuing land interventions), de Vries and Chigbu (2017) qualify the type of land management solutions as 'responsible' if the combined ΔLM changes in structures, processes and outcomes meet the 8 'R' normative requirements: responsive, resilient, robust, reliable, respected, reflexive, retraceable and recognisable. On the one hand, the input and participation of local communities and their ability to foster change play thereby a crucial role (Handler and Gruber, 2016; Schneider, 2016). These include the need to understand change, to develop certain types of attitudes for land management practitioners and decision makers, and to increase both hard and soft skills. In addition, responsibility also depends on balance of a set of norms and values. In view of this, it is necessary to understand and to compare what people and what government aspire when they execute and pursue rural development. This question relates to the choices that people make when selecting data, constructing different kinds of values and indicators when analysing data, using relevant concepts when theorizing situations, and formulating goals to execute relevant and appropriate activities. All of these describe on the one hand what sort of social spatial relations people would like to have, and on the other hand which type of economic models decisions make use of.

Since land management is both a science of practice (learning and interpreting from practical examples) and a practice of science (constructing conceptual notions and ideas which could be relevant for alternative ways of praxis), the approach in this article is threefold. First, it addresses both the current contemporary practical and theoretical notions with regard to 'attractiveness' and 'lucrativeness'. These notions are in apparent conflict. Whereas 'attractiveness' implies a focus on esthetics, appeal, beauty, visual quality, and hence the features to arouse interest to the personal and subjective senses, 'lucrativeness' connotates with profit, economic gain, remuneration, and hence the features which are linked to the more objective issue of moneymaking.

From a practical point of view the challenges and root causes for demographic changes are connected to the requirements for regional identity and pride. This is substantiated with data derived from two consecutive workshops in Munich during which representatives from government and local municipalities from Bavaria in Germany could express their views and react to presentations relevant to the topic. Each year the Chair of Land Management of the

Technical University of Munich together with the Hanns Seidel Stiftung organise a workshop with central and local government officials, practitioners and academics in the fields of land management, land development and rural development. These workshops usually have a central topic which is introduced by both scientific and professional/practical perspectives and which is discussed through interactive workshops. Both the presentations and interactions are synthesized in consecutive documents. The two most recent workshops (2016 and 2017) are documented in (de Vries, 2016a) and (de Vries, 2017). Besides the compilation of impressions and presentations the workshops derive a wealth of data based on personal insights and highly interactive discussions. Both the documented and undocumented results act as empirical data for this article.

Secondly, from a theoretical point of view, a specific set of literature was selected in addition to and based upon the recommendations of the scientific perspectives presented during the workshops. This additional literature review acted as heuristic way to reflect on the various theoretical paradoxes and rationalities which were addressed.

Based on these first two sections of practice and theory, the third stage in this research was to interpret through a discursive and hermeneutic dialogue. This is a dialogue between theory and practice, between thinking and acting, between policy and implementation, between urban and rural regions and between politicians and citizens. The conclusion section reflects on these dialogues and comes back to the key research question, namely whether and how regions can be lucrative and attractive at the same time.

2. Learning from practice – contributions and feedback of local practitioners during the Munich days for sustainable land management

Practitioners in rural regions, both government and administrative officials aiming to shape society through deliberative policies and socio-economic actors and citizens who shape society by expressing opinions and deliberative consumer and voter behaviour, face a number of challenges. One of those constitutes how to deal properly with contemporary changes in rural regions. Long-term population statistics show on average a gradual decrease in rural population numbers, and an increasing percentage of older people as compared to younger people. Such demographic changes imply that fewer people will be available to create jobs and to contribute to public services. Moreover, many practitioners feel that inter-generational gaps may occur as a larger number of older people live together with a smaller number of younger people.

Another, perhaps a less discussed or less expressed, practical problem is the lack of regional identity and regional connectedness. Whilst younger people find their way to more urban centres, they tend to feel gradually less connected to their ‘home’ ground. This is visible in the lack of incentive to invest long-term time and resources in these areas. This lacks of connectedness results in turn to a decrease of local identity, expressed by a group of citizens with shared histories and values. To redress this issue there is a strong need for local heroes, who have their roots in the region and who can also stimulate their peers to create new opportunities.

In order to understand the praxis one has to derive how and why actors choose practical solutions, especially when having to deal with contradicting or competing value systems. At the community level, local mayors and local councils have to find practical ways to resolve competing interests and contrasting data daily. However, can one derive any patterns in the practices and choices, and is there a core of decisions, procedures and solutions which one can qualify as best practice examples? And is it such that actors learn from each other, and exchange experiences and network with peers? Local practitioners argued that this is possible and also needed. This social interaction aspect is crucial for sustainable learning. The documented experiences, expressed views and presented insights indicate that on a more general level, improvements should fixate on:

1. Opting for solutions which are based on quality rather than pragmatism and short-term fixes, e.g. in types of constructions and types of materials, visual aspects of the new designs (of buildings, parks, roads, playground, etc.) and of social sustainability.
2. Opportunities of change.
3. Social connections between generations.
4. Providing facilities to invest in concrete economic and social activities.
5. Enabling individual citizens to invest in housing and private firms/enterprises privately.

More village specific, practitioners considered space for improvement in:

1. Creating or improving self-consciousness.
2. Creating or improving the feeling of pride in the village.
3. Providing a more positive image of citizens in (small) villages.
4. Creating some form of recognisable regional identity.
5. Fostering engagement in local activities.
6. Stimulate and activate people in villages.

These suggestions are used to further the dialogues.

3. Learning from theory – connecting scientific insights in valuing lucrativeness and attractiveness

The theoretical perspectives presented during the Münchner Tage für nachhaltiges Landmanagement in 2016 included the dilemmas related to polyrational property (Davy, 2014), the (in)satisfaction paradoxes (Zapf, 1984) and the impracticality of converting concepts like 'equivalent living conditions'('gleichwertige Lebensbedingungen' / a key concept of spatial planning in Germany) into practical action strategies.

The first, the concept of polyrational property, reflects how different kinds of values, rationalities and logics compete in the determination of the use of land and of buildings (Davy, 2015). The values are at the root of comparing attributes of land and property and provide

a basis to make decisions by relying on the highest possible value, or the optimal value. A choice for regions to be lucrative and/or attractive therefore relies on each of the associated values systems. These are however different, contradictory or even conflicting. For example when optimizing land use using either economic or aesthetic rationalities, it may lead to different outcomes and decisions. Spatial development choices tend to relate to either maximisation of economic gains, on maximisation of equality in opportunities, or on morality of what is right and what is wrong. As a consequence, fostering a national policy, such as reducing spatial disparities, may rely on different values systems and logics that need to be reconciled. All of these factors make a single, uniform, perspective impossible, and make balancing the priorities of rationalities complex. Essentially optimizing values is therefore a paradox in itself, because the optimisation of one value system is usually at the expenses of another value system.

There exist more of such paradoxes when determining the 'attractiveness' or 'lucrativeness' of regions. Issues such as 'the use of spatial justice' ('Gerechtigkeit') and 'quality of living' are important for the question to which degree rural regions are attractive or lucrative. Whilst both issues are highly anchored in German legislation and planning practices, the terms themselves lead to contradictory explanations and developments, expressed by insatisfaction dilemma ('Unzufriedenheitsdilemma') and the satisfaction paradox ('Zufriedenheitsparadox') (Zapf, 1984). These express an apparent inconsistent correlation between the degree of happiness and the degree of development of the social-physical environment. In simple terms, social groups in very bad living conditions may still be very happy, whereas social groups in a very fortunate or attractive environment may still be very unhappy. Apparently, the degree to which people perceive spatial justice and quality of living is highly subjective and changeable. In other words, economic value and spatial inequity does not equate social or individual quality of living, or social value (Mayring, 1999; Noll, 2000). In other words, the fundamental indicators guiding a land use planning process may lead to unintended effects. Attractiveness and lucrativity may thus be concepts which either are leading to the wrong assessments of current situations, or causing unintended effects when used as design criteria for planning and development.

Related to paradoxes, amongst the theoretical and practical problems, one remains reconciling guidelines and associated indicators at different scales. For example, governments and practitioners are required to work with European and national guidelines simultaneously, such as the Cork.2.0 Declaration on Rural Development (European Commission, 2016) at the European level or the 'equivalent living conditions' principles ('gleichwertige Lebensbedingungen') at the German level. The indicators of both of these guidelines may result in contradicting recommendations. Moreover, the required data for such indicators may draw on both objective and subjective measurements, and may draw on a combination of local data and regional data with various levels of accuracy. This makes formulating daily planning decisions complex, and as a result may provide a contested picture about the degree of attractiveness and lucrativeness.

4. Learning through a discursive and hermeneutic dialogue

A discursive and hermeneutic dialogue refers to an iterative discussion related to define meaning and concepts and to the construction of this process. This approach relies on a number of assumptions. The first one is that social realities are both linguistically and discursively constructed. The second one concerns the recognition that new conceptualisations are dependent on the time, spatial and socio-institutional contexts in which the discussions take place. The third is the notion that discourses are a form of social action, i.e. having a deliberate purpose and direction. The fourth is the premise that meaning is negotiated through interaction, rather than being a static issue decided upon by a single actor. Hence, a discursive investigation is not just about what practitioners and theorists say or write, but rather an observation and interpretation of how certain verbal or written statements lead to shared meanings, approved and legitimized action, and construction of narratives and frames. In addition to the discursive assumptions the interpretation process is hermeneutic, implying that once we debate a certain issue in a socially interactive process, we reconstruct meaning in an interactive way. Otherwise put, the concepts and interpretations produced about a social context, in this case the rural regions, are not fully independent from the actors and institutionalised practices in this contexts. Once produced they enter this context and change the context itself. In other words, the knowledge is flexible, dynamic reflexive.

The understanding on improving the lucrativeness and attractiveness of rural regions is derived from four discursive and hermeneutic dialogues: between theory and practice, between policy and implementation, between the conceptualisations of urban and rural regions, and between politicians and citizens.

5. Changing concepts and assumptions on lucrative and attractive rural regions

5.1. Dialogue between theory and practice

Whilst there exists a gap between the discourse of practitioners and the theoretical discourse, there are a number of connecting points. During these 19. Münchner Tage we learned that both shared values and self-consciousness during a planning and development process are important in making regions lucrative and attractive. Each can be further elaborated. Shared values highly relate to shared 'perceptions'. 'Perception' is a complicated issue in both theory and practice. In land management related literature one often sees the term 'perception' as a way to either express a public sentiment towards government officials, government structures or government decisions (Lisec et al., 2014), or as an individual sentiment or justification for individual actions (Celio et al., 2014). The 19. Münchner Tage have however brought forward additional perspectives on 'perceptions'. Individual perceptions are highly influenced by someone's posture and demeanour towards others, while collective perceptions tend to relate to the persuasiveness of images and symbols. The perception about rural regions are highly dependent on these two perspectives. Individual images are sometimes negative due to the lack of connectedness to the region, lack of collective identity and a lack of pride. These occur in the context of demographic changes, an increase of the ratio

old/young people and the daily confrontation with images of empty land or empty buildings. The public image of rural regions is strongly determined by a persuasive discourse among institutional investors that one cannot generate any money in these areas. Instead, the main investments occur in highly urbanised regions.

The second starting point for a shared discourse concerns the issue of activation and mobilisation of people to generate attractiveness and lucrativeness. It is at the root of making any change. One has to realise that formal 'power', derived from a specific function or status does not equate to 'influence' to change or alter a rural region. Instead, one requires both enthusiastic people, charisma and trustworthiness on the one hand, and a firm belief and self-consciousness in enhancing quality of living conditions based on shared identities in order to mobilise people and/or activities into a certain direction. Influence in this way is a crucial instrument for the transformation of ideas into practical actions. Attractiveness and lucrativeness in rural regions constitute therefore principles in their own right, determined and shared by a local social context.

A third issue which requires further study is the issue of identity. Where the discourse of practitioners evolves around the necessity for regional branding as way towards both attractiveness and lucrativeness, the theoretical approaches tend to use equivalent living conditions and quality of life as key concepts. The concept of regional branding is fundamentally based on the notion of uniqueness, whereas the concepts of equivalency and hierarchical monitoring using identical indicators can be associated uniformity. These key values are contradictory.

5.2. Dialogue between policy and implementation

The dialogue between policy and implementation refers to the connection between formulating plans and enacting plans, or in other words, to the theoretical underpinning of stimulation and activation of people versus the actual activity of doing that. Of course, management sciences offer a lot of insights on leadership and influence (Eilles-Matthiessen and Scherer, 2011). However, rural regions require a particular kind of leadership and particular styles of frontrunners. The success in leadership is not only associated to how effective a person can foster economic profits, but it also relates to how supportable a person can address socio-cultural concerns and appeal to local identities. In addition, leadership at local political level is embedded in both the political reality of stakeholder interests at the community level, personal affinity with the local region and a sense of historical familiarity with local traditions, local families and histories. Both the elected mayor and the availability and willingness of citizens who contribute with activities on a voluntary basis play an important role in in these local socio-political dynamics. Starting points to improve practices are listed in Table 1, which distinguishes between 'hard' and 'soft' measures. Hard measures are concrete activities, whilst soft measures are the generic aims underlying the hard measures.

Table 1: Improvements in practical measures

	'Soft' Measures	'Hard' Measures
1	Stimulate a positive self-image	Local/regional branding/profiling/ marketing
2	Engage and activate village community	Citizens execute (part of) the implementation of concrete improvements Actively engage people by positive and optimistic communication and sharing of aspirations
3	Restoration and redevelopment (active & passive)	Reconstruction and/or restoration of empty buildings
4	Improve regional mobility	Car, bicycle and pedestrian infrastructure improvements and/or construction
5	Decrease energy dependency	Utilize possibilities of local (bio)energy better
6	Improve and support entrepreneurship	Make private investments possible through loans and investment funds organised by local community banks Provide subsidies for the production and marketing of local products Organise local events which could attract people from outside
7	Start inter-generational activities and constructions	Utilize and/or set-up club and association structures Develop playgrounds and sport/leisure facilities

5.3. Dialogue between conceptualisations of urban and rural regions

When comparing the discourses on developing urban versus rural regions the key terms used tend to be quite different. Cities are often linked with 'smartness', associated with 'expansion' and 'growth' (towards metropoles, crossing peri-urban boundaries, maintaining compactness etc.), whereas rural regions continue to be associated with agriculture, tourism, energy and community development. A fundamental dialogue between advocates for any of the two is therefore built on different epistemic and thematic subjects. The key epistemic value related to the urban discourse is spatial economic efficiency. Size and distance are the key indicators fostering the urban narrative. Lucrativeness is directly related to the economic

narrative. One is in a city for primarily economic reasons, so decisions, behaviour and fundamental values and beliefs connect to economic features. Lucrativeness relates therefore to high profits and rapid economic gains. Similarly, attractiveness fits in this urban narrative as nearness to economic opportunities and high density and high diversity of services is associated with being positive, hence attractive, features. In contrast, in rural regions lucrativeness is not automatically associated with large investments and rapid economic gains. In fact these values are less relevant in rural regions. Long-term sustainable growth and sustained access to economic markets are the key drivers to remain in rural regions. Attractiveness in rural regions is not so much associated with high density of services, but with having a strong sense of identity and connection to the location.

As a result, connecting the essential narratives of the urban versus the rural regions is not necessarily given because of the different epistemic values. The question is however whether such a common narrative is needed, and whether some crossover appreciation would be a solution.

5.4. Dialogue between politicians and citizens

Following the debates about values, contradictory logics and contrasting improvement strategies for rural regions, there is a need to better define and understand a number of concepts, and to design alternative methods which can make the links between cause and effects more evident. Table 2 lists which concepts and methods require further study:

Table 2: Improvements of theoretical approaches

	Further development needed in concepts	Further understanding needed of following methods, cause-effect relations
1	'Rural territorial region' and (spatial) 'quality of living'	How can changes in the image of 'rural regions' be implemented, evaluated, assessed, and presented? Which factors play a crucial role in the quality of living?
2	'Stimulation', 'activation' and 'mobilisation' of people	How do political power and socio-economic influence play a decisive role in local activation and mobilisation processes? Which factors are crucial for a mayor to get people on board? What is the connection between power and influence?
3	'Spatial justice' and 'spatial equality'	Which methods and/or approaches can foster which type of changes in spatially just or spatially equal investments?
4	(Local/regional) 'branding'	How can subjective and objective indicators on rural regions, living quality and spatial justice be better connected?

Theoretically Kellner (2007) discusses the concepts of image and profile of local communities. These concepts are important for how to 'brand' a rural region and how to foster more recognition of local regions. Studying regional branding will however also necessitate more empirical data on both the issue of regional branding itself (Giles et al., 2013), and the issue of political narratives supporting or creating a local brand (Willett, 2016). This would include for example research about what role regional events, regional activities, and regional products play in first of all degrees of recognition of regionality and rurality. It would also include studies about to which extent local people, products and activities are associated with quality of living and local identity. And ultimately the question to which extent local people, products, interactions and activities can contribute to the substance of lifestyle and livelihood of the rural population.

6. Conclusions

Can rural regions be 'attractive' and 'lucrative'? Yes, it is possible, however, it does not come by itself. It requires a lot of stimulation, activation and engagement. Local mayors play a crucial role in taking up a role of inspiration and aspiration. However, local citizens should also become more engaged and feel more proud of their local region and own identity. The way in which a dialogue between theory and practice, between coordination and regulatory agency and local authority, between urban and rural regions and between politicians and citizens is held is however crucial for the question whether it leads to acceptable and appropriate findings. Does a particular style and structure of dialogue lead to further action and further collaboration, or does it lead to inertia and pessimism?

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Andreas Ortner*, Alexandra Weitkamp*

‘Räumliche Lage’ – A Discourse on Location

Concepts for assessing interdisciplinary application potentials

1. The importance of location for Land Management activities

The term ‘Räumliche Lage’ is used in the German language area. Initial tests with the German term within scientific online databases of research papers rarely delivered search hits. To lead a comprehensive discourse about existing concepts – especially in the European and international context – it is necessary to translate the term into the English words ‘spatial location’. However, this word combination is also seldom used. In English, the single word ‘location’ often represents the term ‘Räumliche Lage’. Therefore, the word ‘location’ is used in this paper as a synonym for the term ‘Räumliche Lage’ (‘spatial location’).

Locations are important for Land Management activities. They enable the valuation of spatial structures by assessing and categorising subject matter oriented representative characteristics. This is required as a basis for spatial development recommendations and practical measures. Often, locations are indicated by land values, though experts are aware that they only represent part of the location. Based on experts’ knowledge, spatial data for analyses is mostly collected on specific topics like economic or social conditions.

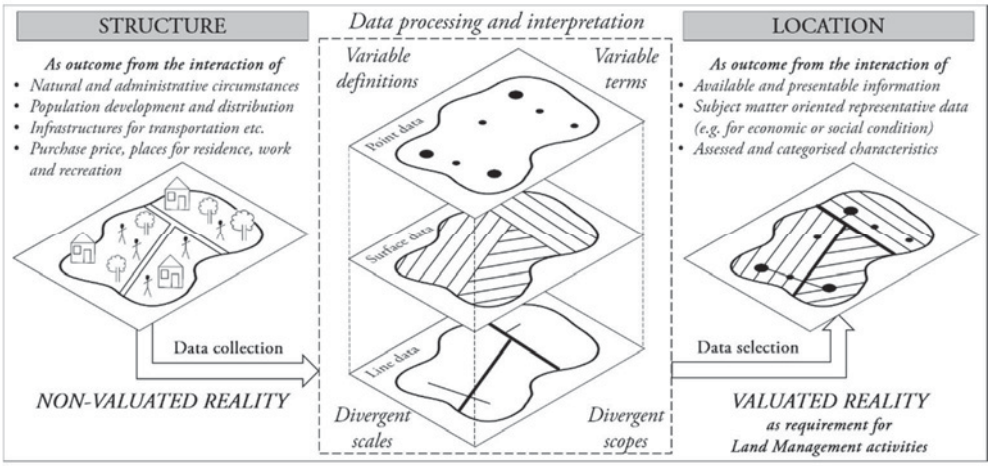

Figure 1: From structure to location.

Such information may be available as point data (e.g. purchase price of land), surface data (e.g. area type) or line data (e.g. line infrastructure). It is necessary to detect the required parameters which influence the location and in consequence the relevance of land value.

* TU Dresden, Geodetic Institute, Chair of Land Management/Germany.

Variable definitions and terms as well as divergent scales and scopes are used for the derivation of locations during data processing and interpretation (see Figure 1). Comparison with or integration in other spatial contexts is difficult. There are knowledge gaps about considerations and approaches that are hidden behind the location concepts. In light of their potential for interdisciplinary application, a comprehensive understanding of the concepts would enable a better framework for the elaboration and explanation of common criteria as gateways for the reliable valuation of locations.

2. Research paper's inquiry and general analysis

The following international literature analysis was undertaken with the help of two approved scientific online databases: Web of Science (https://webofknowledge.com) and Scopus (https://www.elsevier.com/solutions/scopus). In both catalogues the literature search followed predefined rules. On the one hand, the query based on keywords was limited to the title of the research papers to target papers with a strong focus on 'spatial locations' (theme should be at the heart of the papers). On the other hand, the search was conducted using several strong content-related word combinations relevant to 'spatial locations' (see Table 1). The intention here was to also identify papers which cover the same topic but use different words (a high degree of information on the theme should be present). Furthermore, only completely available (fully downloadable) research papers were considered for the analysis. Therefore, some of the database search hits could not be used (exclusion criteria).

Table 1: Keywords search results

Keywords search together/separate	Hits based on title of papers	Hits based on abstract of papers
'spatial location' / spatial and location	33	11
'location value' / location and value	22	17
'location factor' / location and factor	12	10
'spatial indicator' / spatial and indicator	8	6
'location indicator' / location and indicator	2	2
Sum of scientific papers	**77**	**46**

In the Web of Science, the term 'spatial locations' achieved most search hits in the categories: Psychology Experimental, Neurosciences, Psychology, Behavioural Sciences and Psychology Multidisciplinary. In Scopus, most hits were found in the subject areas: Psychology, Neuroscience, Medicine, Computer Sciences, and Engineering. It can be easily concluded that the 'spatial locations' are used in other disciplines more often than in Geodesy, Urban and Spatial Planning, Human Geography, and other neighbouring disciplines. Nevertheless, this inquiry concentrates on the research fields: Decision Sciences, Development, Economics, Engineering, Environmental Sciences, Geo Sciences, Multidisciplinary, Planning, Social Sciences, Transportation, and Urban Studies.

The 'empirical phase' was conducted in December 2017 and led initially to 77 hits based on a review of the papers' titles. In the next step, the research papers summaries were checked. Only papers that made direct reference to the theme were taken up for further

investigation. Research papers that use locations only to explain other phenomenon were rejected (exclusion criteria). Finally, 46 papers were included in the study. The selected papers were distributed over a large number of periodic publications. This seems to indicate the varied application of the term 'location' in different research fields. Four of the journals published more than one paper with questions regarding locations (see Figure 2).

International Conference on Agro-Geoinformatics (1) International Scientific-Technical Conference on Actual Problems of Electronic Instrument Engineering (1) American Politics Research (1) Applied Geography (1) Chinese Geographical Science (1) Cities (1) Economic Geography (1) Environmental & Resource Economics (1) Environment and Planning A (1) Environmental Economics and Policy Studies (1) Growth and Change (1) Indonesian Journal of Geography (1) International Geoscience and Remote Sensing Symposium (1) International Journal of Environmental Studies (1) Journal of Geographical Systems (1) Journal of Real Estate Finance and Economics (1) *Journal of Regional Science* [Impact Factor 1.743 in 2016] (3) Journal of Rural Studies (1) Journal of Transport Economics and Policy (1) Journal of Transport Geography (1) Journal of Urban Planning and Development (1) *Land Economics* (3) Land Use Policy (1) Landscape and Urban Planning (1) Management Science (1) Netherlands Journal of Housing and the Built Environment (1) Papers of Regional Science Association (1) *Property Management* (2) Regional Science and Urban Economics (1) Regional Science Association Papers (1) *Regional Studies* [Impact Factor 2.780 in 2016] (4) Social Indicators Research (1) Studies in Regional Science (1) The Annals of Regional Science (1) The Economic History Review (1) Transportation Research (1) Urban Affairs Quarterly (1) Urban Studies (1)

Figure 2: 46 research papers published in 38 journals or conference series.

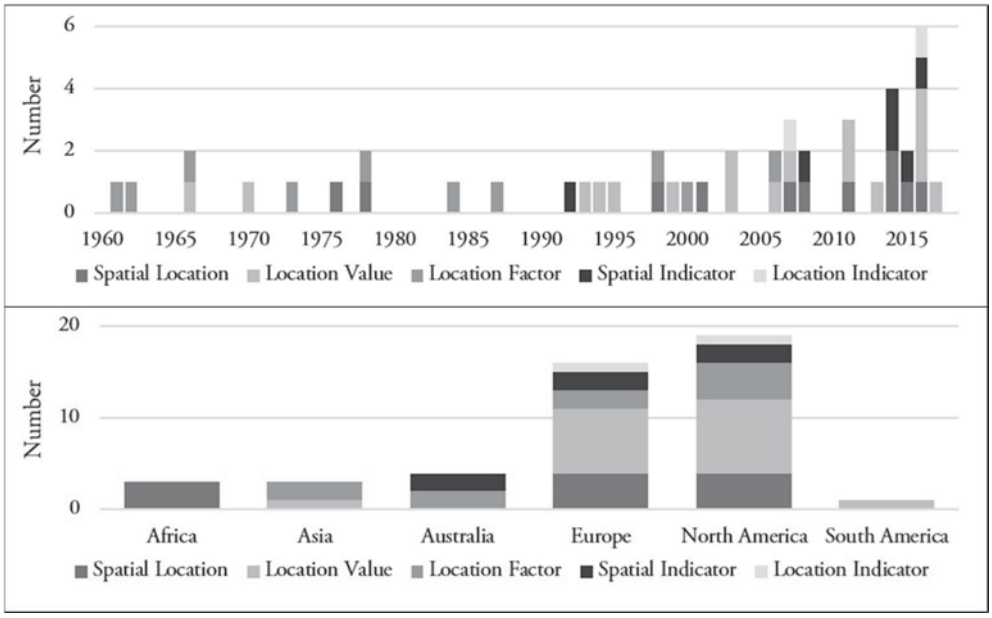

Figure 3: Publication years and places of publication.

In addition, the Journal of Regional Science and Regional Studies have relatively high Impact Factors. Further possibilities for the general evaluation of the papers are the publication years and the places of publication (see Figure 3).

Since the 2000s, the number of available publications related to locations has increased. Nevertheless, it cannot be concluded that the term is more often used today than in the past. Probably, the visible trend is only a result of the increasing digitalisation of science. The published papers come mostly from Europe and North America. But researchers from other continents also work in the field of locations. Therefore, in summary it seems that locations are of interest and of international relevance. The listing of main words from the research papers' titles with their frequency gives further hints about the contents and closely related issues (see Figure 4).

accessibility (2) allocation (2) *analysis* (5) application (2) approach (2) area (2) assessment (1) attractiveness (1) *attribute* (4) business (1) case-study (2) centrality (1) *choice* (5) cohesion (1) commercial (1) community (1) competition (1) concept (3) decision (2) demand (1) density (1) determination (1) development (1) distance (2) distribution (1) *economic* (4) effect (3) employment (1) environmental (1) experience (1) *factor* (9) household (1) *housing* (4) impact (1) *indicator* (8) industrial (2) inequality (1) land-use (1) land (3) landscape (1) law (1) liveability (1) local (1) *location* (43) market (1) method (1) *model* (6) neighbourhood (2) office (1) pattern (2) planning (1) policy (2) politics (1) *property* (5) public (1) region (3) regression (3) *residential* (9) rural (1) segregation (3) *social* (4) space (2) *spatial* (21) stakeholder (1) structure (1) supply (1) sustainable (2) tax (1) theory (2) transport (1) *urban* (7) *value* (18)

Figure 4: Main words from the research papers' titles.

3. Discourse on concepts based on the literature

To determine interdisciplinary application potential, it is necessary to extract common criteria based on an understanding of overlaps between the different concepts. As far as possible, the international literature review can help to extend the German perspective on 'Räumliche Lagen' ('spatial locations').

Table 2: Classification of papers according to spatial scale and discipline

Keywords in papers' titles	Spatial scale			Reference to discipline			
	Local	Regional	National	Geodesy	Planning	Human Geography	Others
'spatial location' /…	5	3	3	-	5	4	2
'location value' /…	13	1	3	4	8	3	2
'location factor' /…	3	4	3	1	3	5	1
'spatial indicator' /…	4	2	-	-	2	4	-
'location indicator' /…	1	-	1	-	2	-	-
Sum	*26*	*10*	*10*	*5*	*20*	*16*	*5*

First, a classification of scales and scopes seems reasonable to identify the spheres of action (see Table 2). More than half of the research papers deal with the local level (57%). Investigations of location value (76%) and spatial indicator (67%) refer especially to this spatial scale. Only 22% of the research papers are related to regional or national scales. Second, with reference to the disciplines, most of the research papers deal with planning questions (43%). 35% of the papers can be assigned to the field of Human Geography, and 11% to Geodesy (referring here to the field of Land Management and Real Estate Valuation). And finally, five of the research papers are more related to economics or informatics than to Land Management.

Based on the research papers that focus on one of the disciplines, selected direct quotations allow a short review of the objects of research (What is the content of research?), the research methods (How is research done?), and the research output (What are the results?). This leads to useful information which is important for determining the interdisciplinary application potential of locations.

3.1. Research quotations focusing on Geodetic contents

Debin and Jiangang (1998, 335) dealt with "the *spatial distribution* of [… city] *land values* and its *relationship* with some *location factors*". The "*regression model* between [… the city] land values and the selected location factors shows that [a main shopping] *road* is the first important location factor affecting the spatial distribution of the land values, the *city center* is the second one" (Debin and Jiangang, 1998, 335). Besides, "the *regional shopping centers* and the *transportation nodes* have little influence on the land values" (Debin and Jiangang, 1998: 335).

Kryvobokov (2007: 257) aimed "to extract *location attributes*, which are *most important* for *market value of real estate* in countries with well-developed markets". The author uses *regression models* and "finds that […] *statistically significant* attributes, which influence the market value, are *obtained for different real estate types*" (Kryvobokov, 2007: 257).

Casson and Casson (2016, 575) showed that "*property rents* in medieval [… cities] were influenced by *classic economic factors* such as location and use of a property". The study "finds *significant relationships* between ordinary rents and property characteristics that are similar to those found in modern studies" (Casson and Casson, 2016: 575).

Briefly summarised, the objects of research are: the spatial distribution of land values, the importance of location attributes for the market value of real estate, and property rents. In terms of methodology, regression models seem to be an appropriate solution for calculations with location factors or spatial attributes. Hence, evidence can be given based on statistical significance. Results refer to the assessment of the relationship between location factors and the evaluation of the importance of several location factors.

Location concepts with reference to Geodetic contents

In Geodesy with the sub-disciplines of Land Management and Real Estate Valuation, locations are used for determining the market values of property. Location is the most important

factor influencing market values – in Germany, the standard land values are derived area-wide by law as an indicator of location. But the usability and quality of property also affect the conditions of land (Sprengnetter, 1994: 3/14/1/1). § 6 Para. 4 of the Real Estate Valuation Law in Germany (ImmoWertV, 2010) defines important location factors of properties. These include transport accessibility, neighbourhood, residential area as well as business situation, and environmental impacts. Nevertheless, this catalogue is not complete. Further criteria can be used to assess locations (Kleiber et al., 2017: 807). In addition, the location factors of properties can be classified on the macro and micro levels (Hugo Steiner AG, 2013) (see Table 3).

Table 3: Criteria for the assessment of location

Macro location factors (selection) Regional level	Micro location factors (selection) Municipal and city-district level
Standard factors *for residential use*	
Population development and structure	Neighbourhood
Economic situation and purchase power	Building site and exploitation
Infrastructure offers and range of services	Social infrastructure and closeness to services
Regional traffic condition	Local transport connections and traffic load
Nearness to place of work	Closeness to administration bodies
Leisure value and environmental condition	Closeness to leisure activities and emission situation
Specific factors *for commercial use*	
Accessibility and parking	Traffic volume
Competing companies	Suppliers in close proximity
Catchment and influence area	Store size and storage facilities

The determination of location factors is quite a complex process, because it is dependent on hardly quantifiable and qualifiable criteria. In Germany, the estimation of land values based on locational factors is undertaken by expert committees. Normally, in regression only a few parameters will test as significant (Soot et al., 2018). New methods are needed for a further structuring of location (Weitkamp et al., 2017: 25). In the value assessment process, the locations of residential areas and commercial situation are classified according to their different qualities (see Tables 4 and 5).

The use of properties as reference units and the connection to location factors enable exact statements to be made about an area. Besides, the classification of properties according to their qualities allows a valuation. It can be concluded that the most important output of location concepts with reference to geodetic contents is the quantification of the value of land based on location factors. In Germany, the locations are normally presented using

standard land values, not as categories. Only a few cities, for example Dresden (Germany), make the effort to prepare a map of location categories.

Table 4: Classification of residential areas in Germany (translated and simplified representation based on Sprengnetter, 1994: 3/14/3/2–4)

Residential area	Definition
Very good	(1) Very quiet residential area with complete greening in scenic locations (2) Generally detached development with 1–2 floors on big plots (3) Privileged location in relation to city centre and leisure facilities, good infrastructure
Good	(1) Quiet residential area with front gardens and no emission burden (2) Detached constructions with up to 4 floors, multiple dwellings with few apartments on big plots (3) High influx connected with many new-build apartments, good infrastructure and good transport connections to city centre
Intermediate	(1) Residential area without special advantages or disadvantages with ordinary apartment sizes, medium distances to city centre, little open space and moderate emissions (2) Multiple dwellings on small plots, terraced and detached constructions with 2–5 floors and many apartments, best connection to public transport systems, moderate vacancy rates
Simple	(1) Residential areas at greater distance to city centre with small apartments, few open spaces, high emissions in non-privileged areas, best connection to public transport systems, very high vacancy rates (2) Compact constructions with 3–5 floors and many apartments

Table 5: Classification of commercial situation in Germany (translated and simplified representation based on Sprengnetter, 1994: 3/14/3/13)

Commercial situation	Definition
Best (1aa)	Prime sites within 1a-locations (e.g. store on marketplace, highly frequented locations)
Very good (1a)	Favoured business situation in pedestrian zones in city-locations
Good (1b)	Outskirts of pedestrian zones in city-locations or in city-districts
Intermediate	Outlying locations, outskirts of city-districts and locations in village centres
Simple	Outside of store groups (single business in residential areas or business parks)

3.2. Research quotations focusing on Urban and Spatial Planning contents

Milan et al. (2016, 335) argue that "*[l]ocation values* have been recognized as an *attractive instrument* to raise municipal revenues". The authors "develop a *framework* to assess the

design characteristics of location value taxes from a *sustainable perspective*, and apply this framework to *assess current practices*" (Milan et al., 2016: 335).

Willigers and Wee (2007, 2086) state that "*[a]ccessibility* is often seen to be an *important determinant* of the location of *economic activities*". The study focuses on "the specification of *accessibility indicators* for *modelling the location choice* of *offices*, with particular application to the upcoming implementation of a *high-speed railway line*" (Jasper Willigers and Wee, 2007: 2086). The authors state "that the accessibility effect of the future high-speed train connection is larger for *business travel* than for *commuting*, the *value of time* of travellers being a *dominant factor*" (Jasper Willigers and Wee, 2007: 2086).

Badland et al. (2016, 565) argue that *"[e]mployment* is a well-known *social determinant of health and wellbeing* and important for the *liveability of a region"*. In this context, the authors *"identify urban planning and neighbourhood spatial attributes* that facilitate *access to employment"* (Badland et al., 2016: 565).

Dziembowska-Kowalska and Funck (2000, 1) research "the importance of [the] *cultural sector* for *competitiveness* and *development* of the *regional economy*". The authors' "paper analyses the *influence of 'soft' location factors*, in particular cultural activities, on the *competitive position of producers* located in different urban regions" (Dziembowska-Kowalska and Funck, 2000: 1).

Briefly summarised, research objects are: location value as an attractive instrument, accessibility as an important determinant for the location of economic activities, employment as a social determinant for the liveability of a region, and the cultural sector as a 'soft' location factor. Methods focus on creating new frameworks or modelling indicators. Results are the assessment of important factors like access, time, sustainability, and development.

Location concepts with reference to Urban and Spatial Planning contents

Urban Planning focuses on concrete measures and solutions on a small scale like the district level. In contrast, Spatial Planning is a cross-cutting and supra-local discipline. The Federal Institute for Research on Building, Urban Affairs and Spatial Development in Germany uses a nationwide spatial classification system for spatial observation and spatial differentiation. This system is based on the indicators settlement and location. Settlement is distinguished with the help of three categories: rural, partly rural, and mainly urban (classified according to population density and proportion of settled surface area at the local scale). Location is distinguished using four categories: very peripheral, peripheral, central, and very central (based on potentially accessible population at the regional scale). The comprehensive determination of spatial types refers to administrative borders (BBSR Raumtypen, 2010). The spatial types are the result of the overlap of the delimitation criteria. Results are based on location specific factors, nevertheless no quantification of the value of land takes place. However, it is crucial that the spatial types in Germany are compatible with the NUTS classification (Nomenclature des unités territoriales statistiques) of the European Union (EU). NUTS-1 level are the federal states, NUTS-2 level corresponds mostly to the administrative

districts, and NUTS-3 level are the counties and urban districts. Comparison between regions from different EU Member States is thus possible (Statistisches Bundesamt, 2018).

3.3. Research quotations focusing on Geographical contents

Shen and Guo (2014, 117) "explore[d] whether *urban sustainability* can be *measured* and its pattern can be extracted from a spatial perspective". The authors' "analyses were conducted to demonstrate how *urban sustainability* was *spatially distributed* across *neighbourhoods* and what *pattern (random, dispersed, or clustered)* could be *statistically identified*" (Shen and Gue, 2014: 117). The results "can be visually provided *for urban planners* and administrators to *minimize disparities* and *balance development* in the *future policy making and implementation*" (Shen and Gue, 2014: 117).

Glasmeier (2007: 221) explains in "*case of firms, transaction costs* and *network facilitate spatial concentration;* in the *case of people, chain migration* and *social networks* reinforce group propinquity".

Johnson and Raskert (1995: 405) study "the *role of other values* that may be important to the business location decision. These include the role of a *quality environment*, *scenic beauty*, *low crime rate*, and *recreation opportunities*". Besides, *"[c]omparisons* are made between *long-time resident business owners* (Old-timers) and relative *newcomer business owners* (Newcomers)" (Johnson and Raskert, 1995: 405).

Briefly summarised, research objects are: urban sustainability and migration of people, networks, environment, scenic beauty, crime rate, and recreation opportunities. The description of pattern or the comparison of developments is used to come up with recommendations for administrations or policymakers with the objective of reducing local and regional disparities.

Location concepts with reference to Geographical contents

Location in the mathematical-geographical sense is the determination of position coordinates on the grid (absolute situation). In addition, geographical location always implies a quality (relative situation) (Spektrum Akademischer Verlag, 2001a). Human Geography and its various sub-disciplines deal with all kinds of spatial differentiations and patterns as well as searching for correlations between independent and dependent variables. For example, Settlement Geography investigates and systemises how settlements are allocated and finds determinants for the size, function, and shape of settlements. In contrast, Economic Geography investigates the spatial dimension of economic processes and activities. Nevertheless, a quantification of the value of land does not take place.

Research on spatial disparities is an important component of Human Geography. Of interest is the analysis of unequal spatial resources and the facilities in an area. Disparities result from differences in natural landscape and differing (non-monetary) location evaluations (Spektrum Akademischer Verlag, 2000b). Spatial disparities are mostly estimated based on a norm for the whole area. The aim is the compensation of disparities and the creation of equal living conditions.

4. Interdisciplinary understanding of location and the potential for application

To discuss differences and similarities, it is useful to classify Geodesy, Urban Planning, Spatial Planning, Regional Development, and Human Geography by spatial scale and according to their implementation orientations (see Figure 5).

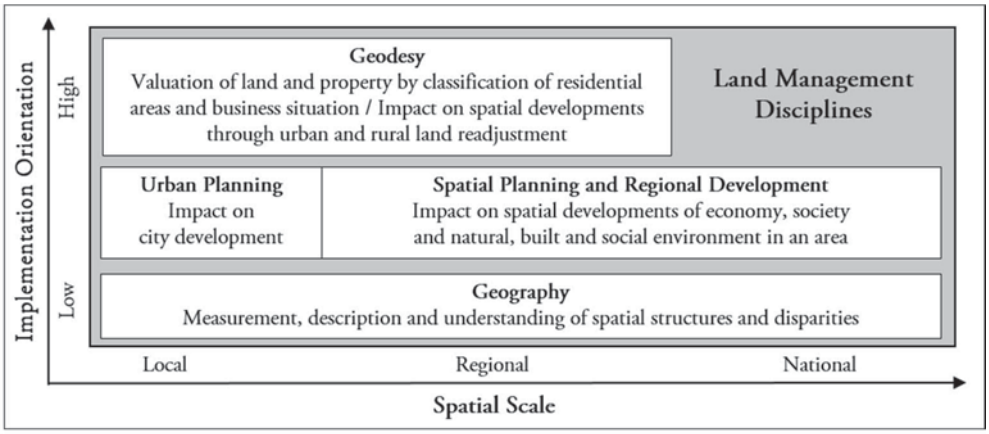

Figure 5: Disciplines classified by spatial scale and implementation orientation.

In Geodesy, the observed concepts and understanding of locations that are used are very concrete. There is a great focus on implementation and practical relevance. For this reason, the quantification of the value of land is possible within this discipline. In Urban Planning, Spatial Planning, and Regional Development concepts and ideas about locations are mostly oriented to future prospects. At this point, the development of trends attracts interest. In Human Geography the many concepts operate with a large number of different perspectives to explore locations. Besides, the activities and impacts of human behaviour become more important (e.g. social components and social space perspectives). The determination of (social) norms is an especially important objective.

Nevertheless, Spatial Planning and Human Geography can be distinguished from one another. Spatial Planning tries to derive spatial requirements from social conditions. In contrast, Human Geography investigates stakeholder decisions which have become spatially significant. So, the aim in Human Geography is to understand the spatial regularities of human behaviour (Langhagen-Rohrbach, 2005: 19).

But finally, the interdisciplinary application potentials arise from similarities, not from differences. Based on the above review and the consideration of the concepts in different disciplines, several findings can be noted. The spatial distribution of location attributes (related to different contents) plays a major role. Besides, the (significant) relationships between the locations' attributes enable spatial dependencies to be explained. Thereby, the derivation of statements is often based on calculations of statistical data in mathematical models. Here, the indicator 'time' often matters. In general, it can be stated:

(1) The observed concepts want to organise, protect, and develop land
→ besides, a close relation to sustainability exists

(2) The concepts provide interfaces to other concepts
→ knowledge transfer is possible, because of the interdisciplinary orientation

(3) Reference to administrative units is generally made
→ important for the analysis of data and the management of location factors

(4) Quantification of the value of land allows land managers and stakeholders to compare the qualities of land
→ essential for decisions about the most appropriate usage of land

(5) The significance of 'soft' location factors (e.g. image of an area) is increasing
→ new requirements for the collection of spatial data exist

Consideration of differences between the scales used within the disciplines can help to fill knowledge gaps in each of the other concepts. The preferred level of research is the local level. The more exact the analysis of a case can be, the better the findings fit. Furthermore, many of the location indicators that are already in use can be applied universally, regardless of the discipline or concept. At this point, researchers only have to leave their comfort zones. Active cooperation with the neighbouring research disciplines seems very helpful. A common research interest exists, the location indicators exist, and manifold methods are available. The Land Management disciplines are pre-designated to cooperate.

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Peter Ekbäck*

Expropriation and Protection of Property

Contradiction or consistency? Some historical indications

Abstract

The foundation for expropriation or taking of real property is a fundamental legal institution in all modern societies. It enables compulsory purchase of real property and property rights in order to accomplish housing, roads, water and sewage, power lines and other types of infrastructure in the public interest. Another essential institution is the protection of property. The right to property is often seen as a basic human right in international conventions and national constitutions.

In media, the popular debates often accuse and impeach legal provisions for expropriation as encroachments of the right to property and the protection of property. The principal idea is that legal provisions for compulsory purchases reduce and weaken ownership content and security.

The thesis for this paper is opposing the standard picture in mass media. It holds that legal provisions for compulsory purchases are necessary to introduce as a response to the development of an effective right to property institution. Without a solid constitutional foundation for property protection, there is no need for a legal basis for expropriation.

An overview case study is presented for the historical and legal development of expropriation and protection of property in Sweden. As a conclusion, a weak relationship is established in support of the hypothesis. However, the closing discussion reveals that the presence of legal foundations for expropriation cannot be taken as evidence of an effective property protection institution.

1. Introduction

Modern societies generally have *legal means for expropriation of real property* and real property rights. The legal institution at issue goes under various names in national legislations, such as takings, eminent domain, compulsory purchase etc. which all concern compulsory acquisition of real property (Alterman, 2010).

A typical mandatory precondition for expropriation is that the acquisition is undertaken in order to achieve or realize some public interest, e.g. housing supply, infrastructure such as roads, railroads, power lines, water and sewage, telecommunications etc., or for preservation of nature reserves and cultural heritage (Miceli and Segerson, 1999). As a principle, the

* KTH Royal Institute of Technology, Real estate planning and land law, Stockholm/Sweden.

affected land owner or right holder is entitled to a fair compensation for his or her loss due to the expropriation, according to statutory provisions (Viitanen et al., 2010).

The cases where the balancing of public vs individual interests results in land owner drawing the short straw often raise media attention and aggravations.[1] The underlying message is often to interpret the existence and implementation of legislation on expropriation as encroachments on the right to property, weakening of the right to possessions, violation of the protection of property, or even outright theft.

The opinions and arguments presented in these debates bring us to another fundamental institution in modern societies – the *legal protection of property*. The right to property is recognized in several international treaties and conventions, such as the Universal Declaration of Human Rights (UDHR) and the European Convention for the Protection of Human Rights and Fundamental Freedoms (ECHR), as well as in national constitutions.

The common features of these different proclamations are: a right for everyone to own or possess property and that arbitrary dispossession of property is prohibited. However, the protection of property is not absolute. The limitations generally include acquisitions that are deemed important for public interests or public use. In these cases, where the property is expropriated, the affected owner or possessor is typically entitled to a fair compensation. The general and unspecific compensation principle opens a rather wide leeway for varying valuation and compensation standards.[2]

It seems therefore that expropriation and property protection are two sides of the same coin. And as mentioned above, the recurrent theme in the popular debate is that the institution of expropriation is in conflict with the institution of property protection. It could, however, be interesting to apply the *opposite perspective* as an experiment of the mind. That is, without a legal protection of property one would imagine there should be no need of a legal foundation for compulsory acquisition. Put in other wording, the establishment and sanctioning of a strong protection of ownership and other property rights may be the triggering factor that creates need for a society to adopt legislation on expropriation/compulsory purchase.

If we turn to curtly survey the justifications for expropriation generally raised in the law and economics literature (Cooter and Ulen, 1988: 191–210), this alternative thesis can easily be reconciled with those findings. The basic argument often advocated is that possessors of strategically located land are in a *monopolistic* situation, and could thereby, in absence of coercive legislation, refuse to transact or demand an unreasonably high price for the land

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1 See e.g. in the Swedish context: von Baumgarten (2017), Moraeus (2016), Hybbinette (2015), and Prytz and Carlsson (2013). Similar viewpoints are occasionally also expressed in more scientific settings (KSLA, 2015). Corresponding standpoints can easily be found internationally, often encouraged by a variety of national "property rights" movements (Jacobs, 2010).

2 Although the question of fair compensation is inevitably intertwined with the right to property, I intend to sidestep that discussion since the theme of this article is independent of different compensation levels. The interested reader is referred to the abundant literature on the compensation topic, e.g. Blume and Rubinfeld (1984), Michelman (1967) and Kalbro and Paulsson (2014).

(Miceli and Segerson, 1999). This is due to the possibility of using the monopoly power to hold out for prices in excess of their true valuation of the land, which in turn will raise the transaction costs for the buyer.

2. Purpose and method

As previously noted, the main thesis of this article is based on the proposition that it is not until a society establishes and effectively sanctions a strong protection of ownership and other property rights that the need for legislation on expropriation arises.

The overall purpose in this article, and the following sections, is to see whether this idea holds true regarding the historical development of these two institutions in the Swedish legislation. A small case study will be undertaken regarding the legal emergence of ownership and property protection as well as of legislation on compulsory purchase in Sweden. The longitudinal case study is based on analyses of existing legislation at different points in time, public records and documentation of legal reforms, as well as legal-historical literature. In order for the hypothesis to be supported, we would expect the arrival of the two institutions to coincide in time.

Regarding the term ownership, a few clarifying remarks may facilitate the following presentation. In this context, the *concept of ownership* is seen as a legal institution whose content at any point in time is defined by legislation (Ekbäck, 2009).[3] Further, the substance of ownership can be described as a *bundle of various rights and obligations* which the law, at any given point in time, confers on the owner of property in relation to other individuals (Alchian and Demsetz, 1973).

Since legislation differs between nations and changes with the passing of time, so will also the content of ownership. The application of a legal-realistic perception of ownership means that it is not possible to identify a single point in time, where some pre-defined substance of ownership is established. It is however feasible to recognize legal reforms resulting in an expanding or contracting content of ownership, as the bundle of rights increases or decreases.

3. Historical overview

The oldest Swedish evidences of *exclusive property rights in land* have been dated to the first centuries A.D. (Welinder et al., 1998: 290). In the western parts of Sweden, agricultural land was divided into long and narrow strips with low walls of stones and soil as demarcations. The delimited parcels included both cropland and meadows.

The advent of these property right manifestations can be related to a simultaneous transformation of the agrarian production technology into permanent, furrowed and fertilized fields

[3] In most societies the substance of ownership is also negatively determined, i.e. comprises all powers not circumscribed by law. This contrasts with limited rights – easements, leaseholds etc. – the content of which is defined in positive terms by contracts or statutes.

in the arable. The need for long-term investments may have justified the formation of stronger and visible property rights for the farmers to possess and manage specific plots. Since no written records are available from this period, we do not have any knowledge of what rights and obligations these possessions entailed.

3.1. The feudal period up to the 1600's

From the middle ages written documents comprise important sources of information regarding different types of land possessions. Primarily the oldest written laws of Sweden (1200–1300) contain a rather ample and detailed account of rights and obligations related to ownership of land in earlier times.

The period is characterized by feudal influences from the continent with *strong hierarchical structures* in society. Feudal society in Sweden was based on land ownership and an agricultural economy of land rent or land tax, paid by dependent peasants in kind or in work to a powerful minority of aristocrats and the Crown. In Sweden, however, the peasants never became villeins, even though the stratification of society was rigorous.

Rural land was classified into three different real property categories, and ownership in these land types was directly associated to the social classes (Ekbäck, 2017: 87–107):

- *Freehold land* [skattejord] was land owned by peasants, which were liable to pay land tax to the Crown.
- *Aristocratic land* [frälsejord] was land owned by the nobility, which were exempted from land tax (in return for military services to the king).
- *Crown land* [kronojord] was land owned by the Swedish Crown.[4]

In the urban areas, which at the time only included a lower number of small towns, only persons having burghership [burskap] were allowed to possess *town land* [stadsjord], i.e. plots for buildings.

Since ownership of land in contemporary Sweden is derived from the development of the freehold land tenure, I will restrict the following depiction to this real property category. During the feudal era, freehold land was encumbered by harsh and extensive restrictions regarding what property rights were available for the owner.

Transfer of ownership was constrained; both relatives to the owner and the Swedish Crown had pre-emption rights in case of sale. Only inheritance rights were unlimited. During different periods the Crown proclaimed prohibitions for peasants to sell off freehold land, as well as injunctions for owning more land than needed for livelihood. In the 15th century freehold farmers lost their right to *grant leaseholds* on their own land, based on the principle

4 Apart from the question of ownership, both Crown land and aristocratic land were mainly occupied and farmed by leasehold peasants.

that a peasant must not tax another peasant (Bäärnhielm, 1995). From a feudal perspective these types of rights could only be granted by the Crown and the aristocracy.

The peasants' rights to certain resources in the forests and grazing lands, held in common by the villagers, were also circumscribed due to various claims from the king and the Crown of having exclusive and sovereign rights (*regalia*) to hunting and fishing, flowing water, mineral deposits, certain species of trees etc. (Ekbäck, 2017: 285–304). By promulgation of aristocratic privileges, these rights were empowered also to the nobility.

During the end of the period, the legal-philosophical theories of "*dominium divisum*" – divided ownership of land – became popular among the aristocracy in Sweden (Hafström, 1970: 17–19). A fiery political contest continued during the 17th century over the stumbling block whether the peasants actually could possess "*dominium directum*" (true ownership) or merely "*dominium utile*" (usufruct rights), since dominium directum was regarded as confined to the Crown and the aristocracy. The fact that freehold farmers paid taxes was taken as evidence of that their legal status did not differ from leasehold peasants who paid land rents of similar amount. From this perspective freehold land tenure constituted no more than an *inheritable right of possession*.

Acquisition of land for public needs

There is no abundance of documented incidences regarding acquisitions of land for different public needs during the feudal era, since legislation on compulsory purchases did not yet exist. Most instances concern decrees from the king and Crown to establish new towns or relocate existing towns to new areas. The common denominator in these cases is that the necessary new land would be *confiscated* by the Crown regardless of previous ownership, where after it was donated by the Crown through specific town charters [stadsprivilegier]. Previous owners and leasehold farmers were normally *compensated with substitute land*.

There are also examples of the Swedish Crown donating additional land to existing towns during 16th–17th centuries, that previously belonged to one or several freehold villages (Björklund, 2010: 71–74). The evicted farmers were typically compensated with land somewhere else, even though there often were conflicts regarding the completion of the compensation.

Recent historical research has also shown that the city of Kalmar, founded during the 17th century, had a medieval predecessor. When the new town was established, the existing inhabitants simply were moved to other areas and the old buildings were torn down in order to make room for the new castle, streets and building plots according to the new town plan (Harrison, 2017).

During the 17th century it also became common for town councils to adopt major plans for *restructuring of urban street patterns*, see figure 1. Although compulsory legislation for implementing the new plans did not exist, the former possessions of the burghers had typically to give way (Prawitz, 1954: 65–66). Compensation was normally fulfilled by the assignment of new building plots.

Finally, the weak legal standing of property protection during the period is also illustrated by the Swedish Crown's confiscation of the property belonging to the Roman Catholic Church in the course of Protestant reformation (around 1550). And around 1680, former royal donations to the aristocracy of land and land rents were to a large extent confiscated by the Swedish Crown (Myrdal, 1999: 338–339).

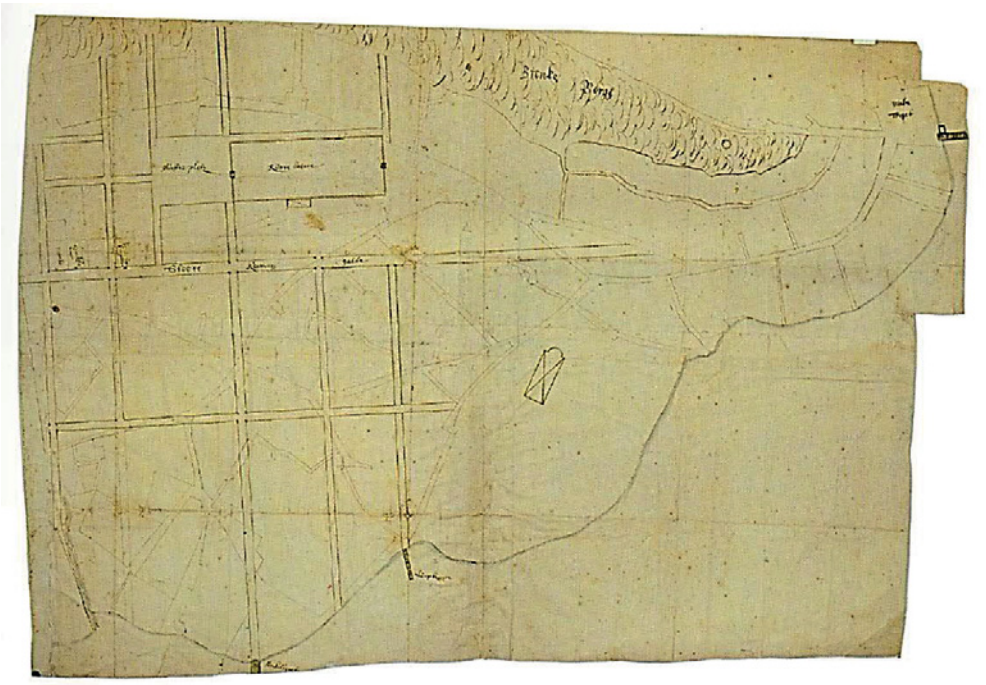

Figure 1: Street restructuring plan for central part of Stockholm (around the Church of Saint Clare) from 1637 for implementation in the realignment of the street network. Notice that the older existing street pattern can be distinguished in the background of the plan.

3.2. Expansion of freehold land tenure during the 1700's

During the first part of the 18th century some legal reforms entailed improvements of the land tenure standing for the freehold peasants, and these can clearly be interpreted as gradual expansions of the "bundle of property rights". One such reform introduced possibilities for peasants to purchase Crown land (1701). Another reform ended the prohibition for freehold farmers to grant leasehold rights (1734).

But the major transformation of land tenures and property rights occurred in a rapid turn in 1789, when the Swedish king Gustav III joined in a pact with the peasantry class in order to undermine the power base of the nobility. By means of a *constitutional overthrow* (coup d'état) the powers and privileges of the aristocracy were strongly reduced, at the same time as rights and privileges for the peasantry were significantly expanded (Bäärnhielm, 1995: 32).

From a property rights perspective, the most important legal act in the reform arrangement was the so called Freehold Purchase Ordinance [skatteköpsförordningen], whereby freehold property officially was *recognized as full ownership*, equivalent to the nobility's ownership of aristocratic land. The ordinance also *restored the freehold peasants' rights to resources in the commons, forests, hunting and fishing, etc.* so that they equated the same rights for the nobility.

The legal reform resulted in equalization of privileges between the social classes and an obvious expansion of the property rights connected to freehold tenure. The reform of 1789 can be interpreted in the light of the new philosophy and theory of physiocracy, foreshadowing the advent of liberalism. These ideas and opinions denoted a conclusive departure from the hierarchical structures and principles in the feudal society.

The enlargement of the "bundle of property rights" for freehold tenure generated a transformation of the previous inheritable right of possession into something that clearly resembles ownership of real property in modern times.

Acquisition of land for public needs

During the 18th century, the previously described establishments of new towns and expansions of existing towns continued, although at a slower pace. Implementation of town plans for restructuring of streets and building plots was still commonly undertaken without legal support.

There is, however, an interesting indication of the emergent protection of property in the new Swedish Law of 1734. In the Building Code, a statement was adopted on the *acquisition of land for public roads* which specified that the location of public roads should be decided by court, and that compulsory purchase of arable or meadows should be compensated in kind by the Crown. This provision is often referred to as the oldest legal foundation for expropriation in Sweden (Hager, 1998: 103). Obviously there had been many public roads built prior to 1734, but the acquisition of necessary land had then been undertaken without legal support.

3.3. Economic and political liberalism in the 1800's

The ideas of the Enlightenment evolved during the 19th century in the direction of liberalism, based on the principles of liberty and equality. Emphasis in the political sphere focused on equal value of all individuals and equality under the law. Several democratic reforms were implemented in Sweden during the period, e.g. a *new constitution* (1809) which was built on the principle of separation of powers and also included an article on property protection, although somewhat vaguely expressed. In 1866 a two-chamber parliament was formed, which finally dissolved the feudal division of society into separate social classes.

In the economic sector, the liberals advocated minimal state intervention in the economy, and freedom of trade and business. As a result, the previous trading privileges of the burghers in towns were gradually reduced, and finally completely abolished in 1864.

The liberal ideas also set several footprints in legal reforms of land ownership and real property rights. One important reform was to repeal the final differences between social classes

regarding rights to purchase and own land of *different real property categories* (freehold, aristocratic, Crown and town land) in 1810. The earlier *regalia claims* from the Swedish Crown were gradually laid down during the 19th century, and completely forsaken in 1875.

Previous restrictions and prohibitions regarding *transactions and transformations* of real property were also abolished towards the end of the century, which meant that the possibilities to divide properties into new parcels for transactions in principle were unlimited. The preemption rights of relatives were eliminated around 1860.

Another movement also resulting in an expansion and strengthening of ownership in land was the *land reforms*, which started in the late half of the 18th century and peaked during the 19th century. These land reforms involved enclosures and replacement of the previous open field system, and had two major implications for the land owners' property rights (Ekbäck, 2017: 26–52).

In the *arable fields and meadows*, the enclosures resulted in a radical redistribution of land and holdings. The number of plots belonging to one farmer was greatly reduced and consolidated into one or two large parcels. This decreased the dependence of collective organization and management in agriculture. But perhaps more significant is the partitioning of the vast and valuable *forests and grazing lands*. These areas were previously held in common, but were allotted to the individual farms as part of the land reforms. The prolonged effect of these enclosures has been to extensively privatize and individualize land ownership.

Acquisition of land for public needs

From the mid-1700's through the 1800's, the older hierarchical society based on social classes successively broke down, and the concept of land ownership was redefined and individualized. The previous feudal society was transformed into a capitalistic. Sweden developed into a liberal market economy, a societal structure with private ownership and freedom of contract.

Interestingly enough, we can for this period discern a *growing aspiration of legal support* when compulsory acquisitions for different types of infrastructure were undertaken, as compared to previous periods.

One early example can be found in Sweden's over time most extensive canal construction project – the Göta Canal – which was undertaken during 1810–1832. The canal project formed the backbone of a waterway stretching roughly 600 km from coast to coast between the Baltic Sea and the city of Gothenburg. The land acquisitions were preceded by a parliamentary decision and an ordinance issued by the government regarding compensation for the necessary properties to be acquired in the project (Bäärnhielm, 1995: 29). According to the ordinance, compensation for lost property should be reimbursed under the same principles as public roads (see above regarding the Building Code of the 1734 Swedish Law).

Another example of the growing necessities of having legal support for compulsory acquisitions can be found in an ordinance issued 1824, which stated that the principles regarding land acquisitions for public roads in the Building Code hereafter should be applicable also

for several other types of roads, such as roads to ports, loading areas, roads between waterways, etc. (SOU 1941:12 p. 10).

In 1845, the first *general legislation on expropriation* finally was issued. An application for expropriation should be assessed by the government, according to a detailed list with specified purposes. The ordinance also declared a right to compensation for losses with 150 percent of the property's value.

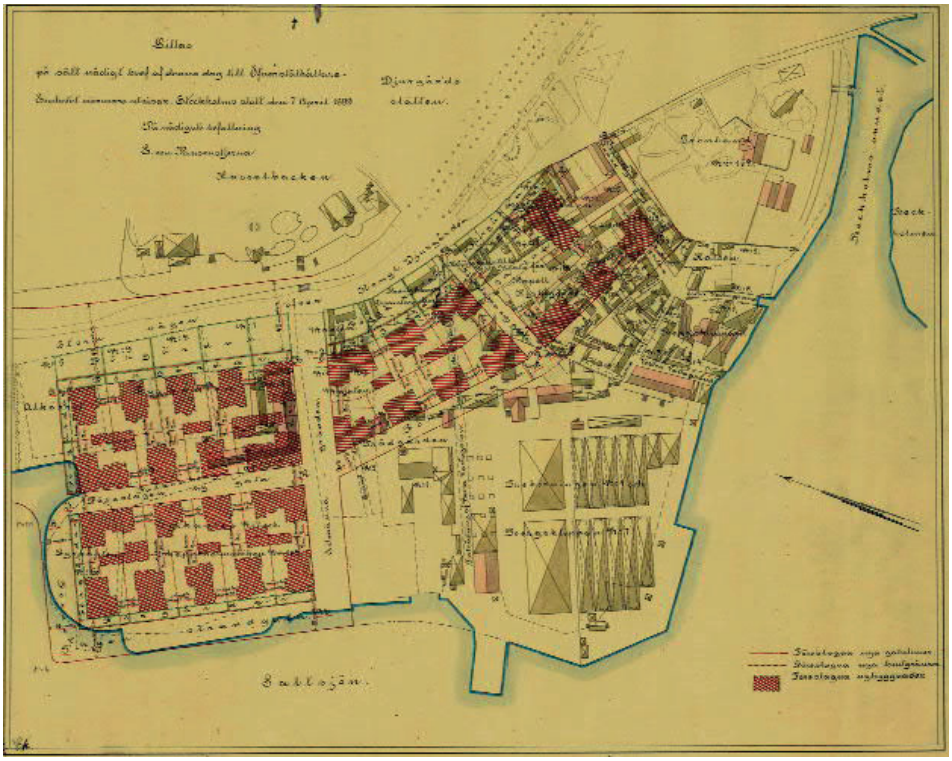

Figure 2: City plan for part of Stockholm (Djurgårdsstaden), adopted in 1899. The plan was not considered legally binding for individual property owners.

An evident manifestation of the modified legal standing and protection of property during the liberal era can be found in the legal outcomes of the new Building Ordinance that was issued by the government in 1874. The Building Ordinance included provisions on city plans and building plot divisions, see figure 2. A general statement prohibited erection of buildings and constructions contrary to plan regulations.

In a number of Supreme Court cases it was soon determined that the city plans adopted under the Building Ordinance were *not legally enforceable against individual landowners*. This perception was based on the legislative procedure, where the ordinance was issued by the government instead of being adopted as a civil law by the parliament (Bexelius et al., 1961: 9). A landowner could therefore in practice partition, amalgamate and reallot the plots as well as erect buildings and constructions regardless of existing plan regulations.

3.4. Development of a welfare state during the 1900's

The 20th century was generally a dynamic and intense period involving major political and economic developments. As a common denominator in the legal reforms that affected real property ownership, the *balancing point between public and individual interests* was distinctly shifted, in comparison with the previous liberal period.

The Swedish Social Democratic Party was the largest party and formed government during long periods of the century, and came thereby to play an important ideological and socio-political role in society. Already in the 1930's the party left the idea of socializing the means of production in society, and instead adopted a reformist alternative. The substitute approach comprised a strategy to regulate, control and restrain specific functions in the ownership concept (cf. bundle of rights) in order to accomplish different societal goals, e.g. by physical planning, taxation, distribution systems, state and municipal commitments, etc. The endeavor was to *socialize certain sticks in the bundle of property rights* and at the same time *constrain the freedom of contract* in specific areas by regulations. The welfare state should be created and developed by means of social engineering [social ingenjörskonst], in contrast to more radical methods.

A limited sample of the vast amount of legal reforms with this orientation can illustrate. An early reform during this period was the enactment of first Forestry Act [skogsvårdslag] in 1903, which included a responsibility for the land owner to ensure regrowth after clear-cutting. A new Act on City Plans and Plot Divisions was adopted in 1907, with legally binding plans and a powerful prohibition to deviate from the plan regulations. The public road network was nationalized during the 1940's, while simultaneously new legislation on public roads enabled compulsory granting of "right of way" [vägrätt].

During the 1950's a new and coercive legislation on protection of valuable nature and shore-line areas was enacted. In 1967 the Act on Municipal Pre-Emptions [förköpslag] was adopted in order to strengthen the municipalities' base for pursuing an active land policy and acquiring properties for community development. Sweden's first Act on Environmental Protection [miljöskyddslag] was adopted in 1969, where after environmental hazardous activities required a special concession (permit). From 1972 the requirements for building permit to erect new buildings were extended also to all rural areas nationwide. The new Expropriation Act from 1972 entailed serious restrictions of the right to compensation in relation to compulsory acquisitions.

In summary, the 20th century regarding real property rights can be described as a period where the bundle of individual ownership rights were reduced as many of these property rights were socialized. The period can further be delineated by the following three distinct trends:

- An increasing number of land uses – i.e. activities and operations – became subjects to *public pre-examination* (by permission or concession) in order to be undertaken.

- *Public commitments* regarding construction and management of major infrastructure was expanded considerably, e.g. with respect to housing supply, transport systems (roads and railroads), power supply, telecommunications, water and sewage supply, etc.
- The legal means for *compulsory acquisition* of land and real property rights for public needs were extended, at the same time as *compensation rights* were reduced.

3.5. The period around the millennium shift

The beginning of the 1990's brought Sweden into two major economic crises, which came to reinforce each other. Firstly, public finances had heavy deficits simultaneously with national debt growing out of control. Secondly, a financial crisis emerged from an over-valued and over-mortgaged real estate market. The latter was in part a consequence of recent deregulations in the credit sector. The quandary regarding public finances resulted in severe savings and harsh cut downs in the public sector.

As a parallel the period from 1990's was influenced by a new liberal atmosphere, which did not only result in new governments formed by the centre-right wing block but also in a general conservative shift over the entire political spectrum.

The new political orientation has among other things, resulted in *deregulations and market openings* of several areas that were previously organized and managed by the state or the municipalities, e.g. the electricity market and other types of power supply, telecommunications, railroad transports, water and sewage supply, district heating, etc.

Late legal reforms in relation to ownership and property protection can easily be interpreted as reinforcements of the bundle of real property rights which connects well to the neo-liberal tendencies of the time. The current Constitution from 1974 resulted in a certain strengthening of the protection of property, mainly by introducing a constitutional *right to compensation*. The constitutional provisions for protection of property have thereafter gradually been reinforced through successive reforms, but it was not until 1994 that the requirement of *public interests* was introduced as a constitutional precondition for compulsory acquisitions (SOU 2008:125 pp. 429–440). This legal reform coincided with the incorporation of the European Convention for the Protection of Human Rights and Fundamental Freedoms in Swedish law.

A new reform was enacted in 2010 where the earlier constitutional "right to compensation" was upgraded to a "right to full compensation". As a parallel the compensation provisions in the Expropriation Act was amended in a more generous direction, e.g. with a 25 percent surcharge added on top of the loss in market value.

We can also in recent years witness a number of reforms of the planning and building legislation that gradually have increased the flexibility and freedom of the individual property owner, as well as liberations of property taxation.

A revealing court case from the Supreme Court of this period deals with the question of a compulsory utility easement for a mobile tower in the UMTS (Universal Mobile Telecommunications

System).[5] Provisions in the Utility Easements Act stated that utility easements can be granted for wires, cables and pipes and other types of utilities. Mobile towers in earlier generations of mobile systems (e.g. NMT – Nordic Mobile Telephony – and GSM – Global System for Mobile communications) had been granted utility easements, but this new generation of mobile systems (3G) did not have any connection between the mobile towers with a physical grid of wires since the technique used was wireless radio communication.

The Supreme Court cited the article dealing with protection of property in the European Convention of Human Rights (Protocol 1, Article 1): "No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by law …" The precondition "provided for by law" must, according to the court, be interpreted in a very limited manner, and not extensively in a broad manner when the assessment concerned compulsory acquisitions.

The application for a utility easement was thus rejected by the Supreme Court, and instead a reform process for amending the Utility Easements Act was initiated by the government. The stronger property protection in recent years had increased the legal requirements for compulsory acquisitions.

4. Discussion and conclusions

Previous sections outline the development of ownership, protection of property, and legal means for compulsory acquisitions in Sweden from the middle ages up to the present. A reasonable question to pose in this final and concluding section may be: What lessons can be learned from the performed historical overview? My main intention is to relate the historical findings to the hypothesis initially formulated in the outset, but before that I believe the approach and exposition can form the basis for a few general remarks and considerations.

Firstly, the content and range of real property ownership has expanded and contracted over time in a *pendulum-like dynamic process*. The movement is perpetual and will most likely never pause, due to political, ideological, economic and technical developments in society.

Secondly, the application of the "bundle of rights" approach to the ownership concept forms a *useful analytical tool* for longitudinal, as well as cross-national, comparisons of land ownership and other real property rights. The perception of ownership as an elastic "bundle of rights" also prevents determining a specific moment in time where ownership of real property was created or established. The ownership concept is instead applicable as long as individuals or limited collectives have possessed exclusive property rights to defined areas of land.

My claim is that the definition of what is ownership and what is not, should not be based on the thickness of the "bundle of rights". The factor separating ownership from other property rights is instead the *residual interest connected to ownership*. Different property rights such as easements, leaseholds, public regulations etc. can extort individual ownership considerably. But as long as a few "bundles of rights" remain, they belong to the owner of the property. The medieval freehold peasant's charges and burdens may have been extensive,

5 Supreme Court, Case no. Ö 956-03 (June 07, 2004).

but the yields beyond taxes and rents to the Crown and the nobility accrued to nobody but the landowner himself!

It is however plausible to compare current real property ownership with the historical predecessors. From that standpoint it seems rather obvious that the major reform of 1789 all at once reinforces the "bundle of rights" in freehold land tenure into something that very much resembles land ownership of today.

Regarding my initially stated hypothesis – that the establishment of an effective protection of ownership and other property rights may be the triggering factor that creates a need for legislation on expropriation and compulsory acquisitions – the historical overview has proven a clear relationship. The establishment of legal support for compulsory acquisitions in Sweden evidently coincides with the expansion of ownership rights and the advent of a legal protection of property. The causal correlation is as follows: *A reinforcement of the institution of property protection calls for a strengthening of the institution of expropriation*.

However we can also observe that the *reversed correlation does not hold true*, i.e. that a reduction of ownership rights could predict a weakening or decline of legislation on compulsory acquisitions. This is contradicted by the Swedish developments during the 1900's.

Nor does the case study support the more general thesis that this relationship holds true in all societies, i.e. the *presence of legal foundations for expropriation cannot be taken as evidence of a strong protection of property rights*. There are abundant international examples of statutory provisions for compulsory acquisitions in systems with deficient or lacking institutions of ownership and property protection. This digression leads further in a direction not previously touched upon, namely the correlation between statutory provisions and the actual implementation of the law. For some societies this relationship is inadequate due to a variety of factors of which corruption is perhaps the most obvious.

As a conclusion the observed correspondence in the historical analysis of the Swedish system has a very limited generalizability, and the question still remains whether the critics of compulsory acquisitions are right or wrong. Perhaps the standpoint in the end must be based on ideological or political estimations? Or answered for each individual society, based on the specific societal context and institutions?

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Reinfried Mansberger*, Walter Seher*

Projects for Higher Education in Land Management

Experiences, opportunities, limits and recommendations

Abstract

Knowledge exchange is an important issue for academic education and training at European and international level. Thus, European Union is funding trans-national research and education programs to enable academic partnership, staff and student mobility as well as capacity building. This paper reflects experiences from three capacity-building projects on the topic of land management, in which the authors are currently involved.

Current activities and outcomes of the two ERASMUS+ projects and one bilateral Austrian-Ethiopian project are analysed in terms of administrative, methodological and thematic aspects. Opportunities and limits of methods applied are evaluated against the background of the respective project objectives. Finally, based on the experiences gained in their project work the authors provide recommendations for successfully operating such knowledge exchange projects.

1. Introduction

The European Academy of Land Use and Development (EALD) has a multidisciplinary approach to land management (EALD, 2018). Accordingly, the members of EALD are coming from different disciplines and scientific fields, e.g. land law, planning, ecology, land economics, and technical sciences. Besides research work, most of EALD members are active in academic teaching. EALD as an association of researchers and teachers regularly organizes scientific meetings in the form of symposia, publishes peer reviewed scientific papers, serves as a platform for international research cooperation and supports activities aiming at creating networks of various stakeholders in the fields of spatial development and soil protection (EALD, 2018).

"Capacity building in land management is not only a question of establishing a sufficient technological level or sufficient economic resources. It is mainly a question of understanding the interdisciplinary and cross-sectoral nature of land administration systems, and understanding the need for human resource development in this area" (Enemark and Ahene, 2003). Against this background this paper focuses on education and training in land management and provides evidence on the importance of cooperation in international capacity building projects. Furthermore, it intends to evaluate knowledge exchange in international university networks in terms of opportunities and limits. In doing so, the authors understand

* Department of Landscape, Spatial and Infrastructure Sciences, University of Natural Resources and Life Sciences Vienna (BOKU)/Austria.

knowledge exchange as a process that brings together different groups to exchange ideas, evidence and expertise.

Knowledge exchange and staff mobility are important issues in academic education and training at European and international level. The European Union has several programmes to support academic partnership, staff and student mobility as well as capacity building, most prominently the Erasmus+ programme, where various activities in the fields of education, training, youth and sport are funded.

Erasmus+ is a bundle of actions, which are summarized in the following three key actions and two other project actions (EU-EACEA, 2018):

- Learning mobility of individuals (Key Action 1 with two sub-programmes),
- Cooperation for innovation and the exchange of good practices (Key Action 2 with four sub-programmes),
- Support to policy reform (Key Action 3 with 13 sub-programmes),
- Sport (with 3 sub-programmes), and
- Jean Monnet (with 6 sub-programmes).

Capacity-building projects in the field of higher education are part of Key Action 2 and support modernisation, accessibility and internationalisation of higher education in partner countries. These activities aim to encourage the cooperation between educational institutions of EU countries and partner countries. The programmes address challenges in management and governance of higher education institutions. This includes quality improvement in higher education, development of new and innovative education programmes, modernisation of higher education systems by reform policies as well as fostering cooperation across different regions of the world through joint initiatives. The objective of Jean Monnet networks is to foster creation and development of consortia to gather information, build knowledge, exchange ideas and to promote European integration (EU-EACEA, 2018).

The University of Natural Resources and Life Sciences Vienna (BOKU) in general, and the Institute of Surveying, Remote Sensing and Land Information (BOKU-IVFL) as well as the Institute of Spatial Planning, Environmental Planning and Land Rearrangement (BOKU-IRUB) in particular, have a long experience with educational projects. The content of the educational projects of BOKU-IVFL and of BOKU-IRUB covers the broad spectrum of land management. Currently both institutes are involved as project partners in seven international capacity-building projects. Since 2000, the authors gained experiences with educational projects funded by national (e.g. Austrian Development Agency), European (e.g. EU), and international (e.g. World Bank) institutions. The projects were operated in cooperation with academic or other educational bodies in Europe, in Asia, in South America, and Africa.

This paper introduces three joint educational projects, which vary in terms of objectives and approaches (section 2). Based on respective experiences the authors review these projects in terms of thematic, methodological and administrative aspects (section 3). In section 4

opportunities and limits of the educational projects are discussed against the background of knowledge exchange in land management. Finally, the paper tries to highlight success factors for a proper implementation of capacity-building projects (section 5).

2. Projects for knowledge exchange in land management at IVFL and IRUB

Currently, the authors are involved in three capacity-building projects with different partners and different contents. Many experiences outlined in the following sections are based on this cooperation. Thus, these three projects are briefly introduced.

2.1. SULANET

The project "Sustainable Land Management Network (SULANET)" is an ERASMUS+ project (action programme: Jean Monnet) and has a duration of 4 years (September 2015 until August 2018). Under the leadership of the Slovak University of Agriculture in Nitra (SUA) the following four universities cooperate in this European project: University of Foggia (Italy), University of Bialystok (Poland), University of Cordoba (Spain), University of Agribusiness and Rural Development in Plovdiv (Bulgaria) and BOKU (Austria). The network of higher educational institutions is based on their professional focus in order to ensure multidisciplinary synergy and excellence in teaching and research activities in the field of land management in the EU.

The overall aim of the project is to create a virtual research and educational "sustainable land management network" with the specific objectives of promoting research and teaching in the field of sustainable European land management and strengthening the effectiveness of land-use governance in the EU (SULANET, 2018).

2.2. ECAP

The project "Enhancing Competencies of Central Asian Universities in Agricultural Policy focused on Environmental Protection and Land Management" (ECAP) is also an ERASMUS+ project (key action programme 2 – Capacity Building in the field of higher Education). It started in November 2015 and will be finished in October 2018. Also in the ECAP project SUA is coordinator. In total three European universities, besides SUA the Czech University of Life Sciences Prague (CULS) and BOKU, as well as four Central-Asian universities, Kazakh National Agricultural University and Kostanay State University (both from Kazakhstan) as well as Karakalpak State University and Samarkand State University (both from Uzbekistan) are cooperating in this project.

The project contributes to the enhancement of theoretical approaches towards land management and environmental protection by developing innovative programme curricula in the fields of environmental protection and land management. It is intended that the project partners will benefit from mutual support of education in both fields through exchange of knowledge and skills concerning environmental friendly agricultural practices and development of legal tools (ECAP, 2018).

2.3. EduLAND2

The project "Implementation of Academic Land Administration Education in Ethiopia for Supporting Sustainable Development" (EduLAND2) was launched in March 2016 and has a duration of four years. It is a bilateral project between Austrian and Ethiopian universities, funded by the Austrian Development Agency in the framework of the APPEAR programme (Appear 2018). BOKU is project coordinator and Debre Markos University, Bahir Dar University (both Ethiopia), and Technische Universität Wien (Austria) are project partners.

The project aims to establish a Land Administration Competence Centre (LACC) at Debre Markos University (DMU) in Ethiopia to alleviate the shortage of trained academic workforce and to conduct problem-solving research in the field of land administration. The project will strengthen the capacities of all the partner institutions in education, research, and management. It provides a significant contribution for sustainable development in Ethiopia in general and the Amhara National Regional State in particular, by joint problem-oriented research, by building academic staff capability, by designing a research-driven bachelor curriculum, by joint research activities and by preparing demand driven community services – all on the topic of land administration. The project intends to contribute to improve living conditions of the local population, to guarantee land tenure security, and to provide an objective basis for decision-making in order to support good governance.

3. Project review in terms of thematic, methodological and administrative aspects

The capacity building projects carried out at both institutes of BOKU differ in terms of thematic aspects (here the authors focus on the different meaning of land management), of objectives defined, of methods applied and in terms of organization and administrative procedures. Main findings concerning these aspects are outlined below.

3.1. Thematic aspects

There are various meanings and definitions of land management comprising a wide spectrum of activities. The projects outlined above thus focus on different aspects of land management. The focus of ECAP is on environmental management mainly relating to agri-environmental issues and related tools of land use monitoring. In EduLAND2, cadastre and land consolidation are the main topics to be investigated, whereas SULANET is concentrated on the understanding of land management as agricultural cultivation and the preservation of agricultural land.

Concerning the project partners the authors could observe an individual understanding of the term "land management". The understanding often depends on the scientific orientation of the academic institutions and on their educational programmes. The partner universities with study programmes in land surveying and geodesy have a more engineering and technical understanding of land management. At agricultural universities the cultivation of agricultural land and soil protection are essential parts of land management. Finally, at universities with an educational focus on legal and planning aspects, land management comprises land tenure, spatial planning, land reform and land consolidation.

3.2. Methodological aspects

Networking in the field of higher education aims at developing new and innovative study programmes, to modernise education systems and to foster cooperation across different regions of the world by joint teaching activities (EU-EACEA, 2018). Knowledge creation, knowledge transfer as well as knowledge exchange as components of knowledge management are used as approaches to gain additional knowledge, skills and competences.

Trainings for university teachers, the implementation of an expert database, study visits, excursions, summer schools, and the provision of relevant supporting documents (e.g. curriculum development manuals) can be listed as instruments of knowledge transfer in the academic environment. They are characterized by activities, where one group of project partners provides information, experiences and expertise for the other partners.

Knowledge exchange can be provided by mutual teaching visits and staff exchange, by workshops and round table discussions or by jointly developing curricula. The methods applied are focused on the exchange of information, experiences and expertise.

Finally, some educational projects include objectives to gain additional knowledge. These objectives can be achieved by joint research studies or by PhD scholarships.

ECAP can be classified as a knowledge transfer project, whereas the environmental challenges in the Central Asian countries and the experiences of the colleagues from the Kazakh and Uzbek universities would be suitable sources for knowledge exchange. Jean Monnet activities foster the dialogue between academics and policy-makers, in particular with the aim of enhancing and improving EU policies (EU-EACEA, 2018). Thus, SULANET is a typical knowledge exchange project. EduLAND2 covers all three components of knowledge management.

3.3. Administrative and organisational aspects

Various institutions are funding capacity building projects. The authors have gained experiences with projects funded by the European Union (e.g. Erasmus+, Erasmus Mundus, Tempus), the World Bank (e.g. Laris), the UN-ODC and by the Austrian government (e.g. Appear, Stiftung Österreich–Ungarn). The guidelines and the framework conditions for organisation and project administration (especially financial aspects) are very diverse.

ECAP and SULANET are Erasmus+ projects, which request in-kind contributions by university teachers, whereas EduLAND2 provides the full covering of staff costs. All projects require periodical project reports including information about project progress and financial statements.

The role of BOKU-institutes was different in the educational projects completed: project coordinator, national project coordinator, institutional project coordinator or just project partner. The kind of role influences the ratio between content contribution activities and administrative activities. BOKU-IVFL is project coordinator of EduLAND2 and national project coordinator for ECAP and SULANET. BOKU-IRUB is project partner in these projects.

The role in the project is often defined by the involvement of the organisation during project preparation and application. BOKU-institutes accompanied the application of EduLAND2 from the very beginning. In the ECAP-project, the two BOKU institutes were involved in the elaboration of individual work packages. In the SULANET project BOKU joined the project consortium just before project submission.

4. Opportunities and limits of knowledge exchange projects

Participation in knowledge exchange projects reveals their strengths and weaknesses. The following two sub-chapters provide evidence about opportunities and limits of such projects which are based on personal experiences, gained during the authors' long-term involvement in capacity building projects. These opportunities and limits reflect the perspective of a European partner.

4.1. Opportunities

Knowledge gain for project members
Capacity building is often regarded as a one-way knowledge transfer. The authors cannot confirm this statement. They are convinced that all project partners gain new knowledge. The most important requirement is personal interest in and commitment to the project.

Teaching experience in English language
In educational projects, partners from different countries form the project consortia. They usually communicate in a world language, mainly in English (but also in French and Spanish). If teaching activities (e.g. summer schools) are part of the project they have to be organised in English. So teachers are forced to use this language, which improves their teaching experiences in English language. This is also useful for teaching at home universities, as there is an ongoing trend to international study programmes taught in English.

Cultural exchange between partner countries
During capacity building projects the partners have short-term and/or mid-term stays in almost all of the partner-countries. These stays allow to get acquainted with other lifestyles and habits and enables cultural exchange between project partners. Intensive cooperation often leads to friendship between project members, which is a suitable basis for continuing teamwork.

Attainment of international experience
Educational projects are characterized by participation of both older university staff and young project members. The older partners contribute with knowledge and experiences whereas the younger are able to introduce novel approaches. This is a win-win situation for both groups. Young teachers and researchers additionally get the chance to attain international experience.

Extension of networks as a basis for follow up research activities
As the number of involved persons is usually higher in teaching than in research projects cooperation in knowledge exchange projects builds and extends professional networks. The

extended network is a breeding ground for cooperation and future (research and teaching) projects.

Capacity building in partner countries

One important objective of capacity building projects is to increase professional knowledge in partner countries. This objective could be achieved in all the capacity building projects outlined in previous sections of this paper. Due to a high commitment of project members, project benefits were increasing over the years.

Awareness raising for land management issues and activities

With the result of an increased number of land management experts in higher education, capacity building projects extend the number of experts in the profession, form a critical mass for scientific discussions, and enable a higher potential of awareness raising for land management activities, especially in countries outside of Europe.

4.2. Limits

No "cash-cow" projects

From a financial point of view, participation in educational projects is not desirable. Various project programmes (e.g. Erasmus+) require in-kind contributions from partner institutions, in most cases by experienced researchers. However, this kind of projects have a non-monetary benefit: In the beneficiary countries the value-added is an increased number of higher educated professionals and an improved teaching infrastructure. All participating countries benefit from an expanded network.

Additional workload for senior lecturers/scientists

The involvement of experienced teachers and researchers is a beneficial factor in capacity building programmes. Usually, senior teachers and scientists have substantial teaching and research duties at their own universities. Often they are also involved in academic administration and in professional associations. Participation in capacity building projects thus is an additional workload.

Limited possibilities to involve young researchers

In addition to the statements above, the enhanced involvement of senior lecturers and senior scientists, especially at European universities, is a major constraint to involving young colleagues in educational projects. Furthermore, young scientists are often dependent on financing by research grants. This is an additional constraint because capacity building projects provide low funding for personnel costs.

Limited research outputs

The number of publications and the amount of project funds raised are main performance indicators at universities. Rankings of universities are based on these parameters. Results of capacity building project are rarely reflected in high-level journal as research activities are not the focus of this project type.

Heterogeneity of project partners
In educational projects, non-European partner institutions usually recruit team members by themselves based on professional orientation and language skills. As for training sessions (e.g. in the ECAP project) 20 or more experts are invited per partner, the gap on persons fulfilling both criteria has to be filled. This results in a heterogeneity in professional and language skills of non-European project members resulting in challenges concerning knowledge transfer and knowledge exchange.

In most of the previous projects, BOKU-institutes delivered training sessions by consecutive translation from English to the national language of the individual project partner. Nowadays the situation improved, as project coordinators increased the pressure to send people with English language skills. This is also beneficial for the scientific success of the project, as a high correlation between the willingness to learn a foreign language and to be motivated for professional development can be observed.

Continuity of cooperation is not guaranteed.
Capacity-building projects usually last for four years maximum. During this time the project coordinator actively moderates the collaboration and organises regular meetings. After the end of the project, the partnership between the participating institutions has to maintain the further cooperation. Often, lack of personal and financial resources is an obstacle for continuing the cooperation.

Review focus of donors on administrative and not on scientific criteria
The administrative workload for running educational projects has been multiplied within the last two decades due to extended documentation requirements concerning project progress and spending of project money. The authors can understand the need for advanced regulations in order to avoid misuse of project resources, but donors should be also aware that it is the main interest of teachers and researchers (and also of the project) to develop teaching and research content.

As project reviews are mainly focused on organisational and financial activities, there is a considerable gap between ambitious objectives (outlined in the project proposals) and project implementation. Due to the underestimated workload for administrative issues, a tendency to fulfil minimum project requirements is obvious.

5. Recommendations and conclusion

In total, both authors participated more than 30 years in teaching projects. This involvement includes cooperation with different project partners from different countries and different responsibilities (project coordinators and project partners). Project topics reflect the wide spectrum of land management. Projects were funded by various organisations.

In this final section, the recommendations for application, preparation and implementation of higher education projects are listed. The statements reflect good practices derived from recent projects. Due to the individuality of each project these findings have to be regarded as generalized success factors.

Recommendations for project preparation:

- Build consortia with partners you know and select partners with complementary competences.
- Discuss the term "land management" at the very beginning. Use suitable literature to achieve a common understanding of the term (e.g. Williamson et al., 2010; Mattsson and Mansberger, 2017).
- Take enough time for preparing the project proposal. This document includes all essential project features (work packages, schedule, milestones, deliveries, budget), which can only slightly be adapted during project implementation. Take into account the increased workload for administration.
- Clearly define duties in the project and involve responsible project members/partners in project preparation.
- Funding for preparing the project proposal ("seed money") – as provided in the Austrian Appear programme – enables intensive discussions on contents and budgets during the elaboration of the proposal.

Recommendations for project preparation:

- Give special attention to the kick-off meeting. Save enough time for discussing the details of the project. All project members have to attend this meeting and at the end of the meeting, all project partners should commit themselves to the documented outcomes.
- Keep donors, university managers and involved stakeholders informed about the project progress.
- Maintain continuous and regular communication between all project partners during all stages of project implementation – also in times with less joint activities.
- Define internal project rules and share responsibilities for reporting activities. The project coordinators should provide deadlines and formats. Structured templates facilitate the handling.
- Establish a quality management system suitable for project tasks. Keep it short and simple – e.g. the status of each work package and of deliveries can easily be classified by a traffic light system (green light indicating the accordance with the project plan, yellow indicating slight deviations from project plan, and red indicating a need for action to fulfill project requirements).
- Involve partners in project achievements. Inform project members about achieved milestones, delivered project reports and about positive feedbacks concerning project and project implementation.
- Include activities to support mutual learning and understanding of each other's culture to strengthen the partnership.
- Include joint research studies and preparation of a follow-up project proposal to continue cooperation after the end of the project.

Conclusion

In the previous paragraphs the authors discussed opportunities and limits of capacity building projects for higher education in land management. The number of weaknesses mentioned equals the number of respective strengths. This balance, however, should not lead to wrong conclusions. Participation in higher education projects is a win-win situation for all project partners involved.

The authors are still motivated to continue their participation in teaching projects. They regard their work to be a necessary contribution to society, even if the scientific output is significantly lower than in research projects. Above all, the quality of projects increases over time.

The final recommendation of the authors in the end: Participate in capacity building projects.

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Armands Auziņš*, Tine Köhler**

Cause-Effect Relationship Between Land Fragmentation, Multi-Functionality and Development in the Context of Incremental Urban Development

A collaborative study of Latvia and Germany

Abstract

Urbanisation is the defining phenomenon of this century, and thus urban containment is a key challenge. Land fragmentation and its possible negative effects on land use and development are usually not taken into account. Multi-functionality appears from activities of stakeholders representing the interests of various sectors. Although the land use in an area is regulated through spatial planning system and set institutions, some externalities – e.g. abandoned areas and scarce engineering infrastructure – during the implementation of spatial development plans can be identified. These externalities may compromise sustainability in land development. Land development basically involves qualitative changes in land use, and thus intensifies it. If considering the fragmentation and the stakeholder's interests to keep the multi-functionality, the implementation of urban development would be improved. This paper aims to explore a causational relation between land fragmentation, land use functionality and land development. The study is based on comparative analysis by deploying basically quantitative methodology. The main outcome of the research shows the interrelationship between three land-shaping attributes, which considerably influences the incremental urban development.

1. Introduction

Incremental urban development and suburbanisation are ongoing processes (Haas, 2012) in the growing urban areas in Europe and beyond. Despite of framing concepts as the Sustainable Development Goals (SDGs) of the UN, New Urban Agenda and Smart-Cities-Concept, urban development still suffers from lack of systemic approaches considering cause-effect relationships of land shaping attributes. King and Burton (1982) argue in their 'notes on a fundamental rural spatial problem', that fragmentation has rational ecological and economic bases. On the one hand, it is recognised that land fragmentation is often hampering agricultural and rural development when both land ownership and land use are highly fragmented (Hartvigsen, 2014; Timofti et al., 2015). On the other hand, segmented and subdivided landscape enhances its availability and thus the touristic attractiveness of a region

* Riga Technical University, Institute of Civil Engineering and Real Estate Economics, Riga/Latvia.

** Frankfurt University of Applied Sciences, Faculty of Architecture, Civil Engineering and Geomatics, Chair of Land Management/Germany.

(Sklenicka, 2006; Crecente et al., 2002; Bonfanti et al., 1997). However, land fragmentation and its impact on land use and development comes more topical if considering: (1) an urban expansion due to driving forces in urban fringe, e.g. demand, employment, migration, urban development, and (2) an influence on beyond the land tenure, e.g. changes in land structure and landscape, existence of species, maintenance of rural morphology, following traditional life-style. Accordingly, land fragmentation issues and causes for land use change should be explored to identify its relationship and various effects to be assessed as well as to support decisions for sustainable development.

In the comparative study a causational model is designed, in which three land-shaping attributes, i.e. land fragmentation, land use functionality and land development are related to each other. These attributes may differ by type, extent and degree.

Land fragmentation results from comparatively small agricultural holdings (European Model of Agriculture, Cardwell, 2004) and farms divided in many parcels. In Latvia and Germany both rural and urban development is improved by land consolidation and readjustment. However, significant differences were identified when observed the institutional settings and practices. In Germany a comprehensive and integrated approach has been practised under the Federal Building Code since the 1960s (Linke, 2004). But, in Latvia the land consolidation follows simple real property formation and cadastral procedures. Land Management Law (2014) determines the land consolidation process, but the adoption of governmental regulations on development and implementation of land consolidation projects the legislator postponed till 2019.

Multi-functionality appears from activities of stakeholders representing the interests of various sectors, e.g. agriculture, forestry, natural protection, transport, housing, industries etc. Multi-functional land use is the combination of different socio-economic functions in the same area, and as a planning concept focuses on the exploitation of the economies of synergy (Rodenburg et al., 2003). The development of a spatial-economic model to design the characteristics of multi-functional land use should allow also analysing its welfare effects (Vreeker, 2004). Thus, multi-functionality determines the use-value of land comprising externalities, intrinsic value of the land/nature and the existence/non-use-value of resources (Cross, 1989). De Groot and Hein (2007) suggest general framework for the analysis and valuation of landscape functions, i.e. provisioning functions (direct use values), regulation functions (indirect use values), habitat functions (option values), and cultural/amenity functions (intrinsic values). Their study recognises necessity for more balanced decisions regarding trade-offs in land use planning to manage the increasing demand for space and resources. However, the crucial question here should be addressed how to identify and quantify the benefits of multi-functional landscapes, especially, if we assume their dynamic changes in terms of values.

Land development can be seen as value added to property through benefit/cost assessment at specific area/site. Dunkerley (1983) suggests development scheme showing the correlation between qualitative changes in land use intensity and changes in land value in the process of

land development. He relates these changes to the creation of capital value of land through capturing investments and benefits. Hong and Brubaker (2010) divide the roots of increasing values into five main categories. 'Value steps' are designed according to property development phases. The presentation of 'value steps' has been used by e.g. Christensen (2011) and by comparative studies of public value capture under EALD (European academy of land use and development) frame to assess value changes during urban development (Hendricks et al., 2017, Jurgenson et al., 2017).

The *aim of the study* is to explore a causational relation between land fragmentation, land use functionality and land development. The study is based on comparative analysis of Latvia and Germany by deploying basically quantitative methodology, including brief description of spatial planning systems and selected case study areas of vivid incremental development. A discussion leads towards synthesis of the outcome of comparative analysis. The hypothesis of the research has been drawn: there is a relationship between three land-shaping attributes, which considerably influences the incremental urban development. The research context of incremental urban development highlights the topicality, in particular, in areas of transition between urban and rural territory, affected by pressure of urban development but with a rural morphology.

2. Institutional settings

For better understanding the relationship and thus its effects the institutional settings need to be outlined. Following an institutional perspective, this paper refers to the concept of socio-institutionalism or "sociological institutionalist perspective" (Gonzales and Healey, 2005) that emphasizes the complex interplay of governance episodes, processes and cultural (place-specific; cf. Reimer, 2013) assumptions guiding planning and urban development. Thus, the legal and administrative structures and competences that shape urban development (formal institutional settings) are introduced first to search for governance relations in land use, planning and development.

However, Reimer and Blotevogel (2012), Knieling and Othengrafen (2009) as well as Healey and Upton (2010) argue that urban development is not determined by law and artefacts (plans, strategies, programmes) only, but that the interpretation and negotiation of framing concepts (as the SDG 11) and tools and instruments (as local plans or land-reallocation) depend on domestic context and stakeholders. Thus, the context-related characteristics (informal institutional settings) are outlined. The issues related to land fragmentation, land use and development phases practically are solved by the implementation of spatial development plans.

In Latvia three planning levels have been determined by the law, however, only at municipal level a physical/spatial development plan is elaborated. The sustainable development strategies are carried out at both national and regional levels. Table 1 briefly informs about spatial planning system in Latvia.

Table 1: Planning tiers and artefacts of Latvian spatial planning system

Level	Plan/Planning Artefacts	Content/aim
National	Spatial Development Planning Law, Sustainable Development Strategy of Latvia	Prospect of spatial development (text and schemes of national priority areas)
Planning Regions (5)	Spatial Development Strategy of Planning Region; covering sectoral developments such as locations of retail	Potential and axis of spatial development concerning whole region (text and schemes of regional priority areas)
Municipality (119)	Comprehensive plan including permitted land use and regulations of land use and building Sectoral/thematic plans Other artefacts	Spatial development in the next 12 years, covering the whole municipal area (designating land use by 13 functional zones and sub-zones (land use patterns). Supplemented by Local Government Strategy and Development Program for 7 years.
	Local plans (part of municipality) / Detailed plans (smaller area / site development) Other artefacts	Designating in detail plots, type of land use and buildings, coverage, plots, areas which may or may not be built

According to Spatial Development Planning Law (2011) the local plans, like comprehensive ones, have also legally binding parts, which among other provisions may provide changes into permitted land use if those are in compliance with the objectives of sustainable development strategy of the municipality. A detailed plan of a part of municipal territory should be developed to lay down the requirements for the use of specific land units and building parameters as well as to adjust the borders of land units and restrictions. The detailed plans have also legally binding parts, but they cannot provide changes into permitted land use (Jürgenson et al., 2017). A detailed plan is mandatory before commencing new construction or subdivision of land units if it creates a necessity for complex solutions and unless laid down otherwise in laws and regulations. Thus, the interplay between spatial planning and land development is defined and observed. Local governments based on centralised and local regulations are responsible for key decision-making regarding to implementation of plans. These decisions are binding to property owners, developers and to economic sectors in general.

Land Management Law (2014) defines a land consolidation as "a set of measures within the scope of which complex rearranging of land borders is carried out in order to form a rational structure of holdings and area of land parcels, to promote development of the rural infrastructure and rural development, as well as environmental protection". The law imposes conditions, e.g. "if the quality assessment of agricultural land exceeds 50 points, the local government shall ensure land preservation of this valuable agricultural land, determining restrictions for land subdivision and for changing the category of land use" and determines a process of land consolidation. Among other provisions of land consolidation process, the Land Management Law determines the land evaluation procedure and that the ratio of relative assessment of land parcels has to be considered in the elaboration of land consolidation projects (Latvijas Vēstnesis, 2014a). However, the adoption of proper

governmental regulations on qualitative evaluation of agricultural and forest lands as well as on relative assessment of land parcels carrying out a land consolidation project has been postponed from 2017 to 2019. From the institutional perspective this demonstrates an interplay between implementation of spatial plans and real property formation, which is concerned with cadastral procedures.

It is necessary to mention here that some centralised institutional arrangements in relation to spatial development planning and for the purpose to diminish risks of negative externalities and urban sprawl have been recently introduced in Latvia. Accordingly, central governmental regulations determine that the residential and mixed centre built-up functional zones can be determined only in urban areas, i.e. towns and settlements (Latvijas Vēstnesis, 2013) and that, in addition to designed territories by comprehensive and local plans as well as if planned complex built-up territories, the detailed plan must be developed if planned 3 and more new land units in the residential, mixed centre and public built-up functional zones (Latvijas Vēstnesis, 2014b). Thus, all three types of plans and cadastral map with designed property units and provided textual information are relevant when collecting data for comparative study.

In Germany four planning levels are recognised. Table 2 briefly informs about spatial planning system in Germany.

Table 2: Planning tiers and artefacts of German spatial planning system

Level	Plan/Planning Artefacts	Content/aim
Nation	Development Act, Strategy of Sustainable Development	Key principles of spatial development (text only)
Federal States	Plan of general spatial development; sectoral plans (historical, nature protection etc.)	Central places (following Christaller's Central place theory) and axis of development (mainly text)
Planning Regions	Regional spatial plans; plans covering sectoral developments such as locations of retail	Spatial development concerning whole region or at least several municipalities/cities (map and text)
Municipality	Comprehensive land use plan Sectoral plans Other artefacts	Spatial development in the next 15 years, covering the whole municipal area (designating land use only by building land or agriculture/forest, etc.) Nature protection, development of inner city etc.
	Detailed/zoning plan Other artefacts	Designating in detail the building land in terms of plots, type of land use and buildings, coverage, plots, areas which may or may not be built

Since the 1960s national regulations define functional zones as mixed or for housing. If the planning authority (usually the municipality) determines a mixed zone, the determination itself already shapes the urban pattern of the area. Therefore, the regulation already sets the density (max. 60% of the plots would be allowed to be covered by buildings), the share of

residential and service (each 50%) and permissible noise level (60 dB in daytime, 45 dB in night).

All detailed local plans have to be derived from the comprehensive plan. The latter one already defines the possible new built-up zones that are usually located next to existing neighbourhoods. In consequence, the land use in developed areas is to a large extent definite. Multi-functionality is noticeable for rural land next to developed land in growing regions. There is a development level of rural land beyond rural and before development land. It is considered as the valuation of agricultural land in which the expectation of a non-agricultural use, without planning intentions, is specifically identified. Older studies have shown that in these cases the land is sold at higher prices than average agricultural land, some explored the expert values, which seeks to determine, how much higher prices for such land are currently and whether the price effects classifiable to different categories of land.

Development of rural land use to urban follows a detailed/zoning plan where the building land in terms of plots is designated in detail. The land use change is introduced and land fragmentation abolished through implementation of the plan. The implementation under responsibility of a developer is concerned with reallocation for building land and consolidation for appropriate infrastructure. In the appraisal of market value during the reallocation process the land use is considered, but not the multi-functionality.

Likewise in Latvian institutional perspective and planning system, the interplay between spatial planning and land development is defined and observed. The land reallocation process involves real property formation and integrates determination of market values of the land. All available types of plans, land appraisal and cadastral map with designed property units and provided textual information are relevant when collecting data for comparative study.

3. Case studies

The case study areas were chosen to make it possible to identify a causational relation between the type, extent and degree of three land-shaping attributes and perform the comparative analysis of two-country cases. Therefore, the areas of similar size, close to the border of urban containment/settlement, with various (three or more) planned land use patterns but where still rural morphology exist, as well as the areas with some extent of physical and/or activity fragmentation were preferred. To better understand the territorial circumstances and make some comparative study as well as to analyse the relation between land fragmentation, multi-functionality and a potential for further development in the area, the land base values (LBV) of the municipal administrative territory have been chosen. The relevant to studies aspects and available units of analysis for comparisons are discussed in Section 4.

3.1. The case of Latvia

The case study area is selected at the border of settlement Dokupe, which lies nearby sixth largest city in Latvia by population – Ventspils. If analysing orthophoto map with attributed

borders of cadastral land units (see example in Figure 1), the individual housing, farmsteads and agricultural lands are identified in the territory. According to the municipal spatial plan, the case study area in Latvia is situated close to the settlement area and concerned with three different functional zones – agricultural (L2), individual residential housing (DzS) and industrial in the middle (see example in Figure 2).

Figure 1: (left) Cadastral land units on orthophoto map.
Figure 2: (right) Municipal spatial plan.

The State Land Service of the Republic of Latvia (SLS) determines the cadastral value according to common methodology, which in general prescribes the cadastral value base. The base values and correction coefficients are based on analysis of real property market data (Latvijas Vēstnesis, 2005). Cadastral value base includes values' zoning (a map with homogeneous zones for each real property group) for both rural land (agricultural land and forest land) and built-up land (Valsts zemes dienests, 2012). The cadastral valuation basically serves for taxation purpose in Latvia, but the values can be used as comparable variables. Cadastral value base by real property groups is re-approved every four years.

The case study area can be designated as peri-urban area, which is located in value zone 1, however, nearby existing value zones 2 and 3 also should be considered for new developments where still rural morphology largely dominates. LBV of agricultural land have been captured in all rural area of the municipality, and these differentiate by quality groups (III–IV as medium in case study area). Since 2011 there are introduced purposes of real property use in the official classification with a designation 'unserviced built-up land', which has no main engineering infrastructure, i.e. road to access and electricity built (Latvijas Vēstnesis, 2006). The purpose of real property use has to be determined for each land unit by the municipality decision. SLS provides data (online database https://www.kadastrs.lv) about LBV for different purposes of real property use in the municipal territory. In the case study area, the LBV of agricultural land of medium quality is 0.09 €/sqm. However, the LBV of residential and commercial land is 0.57 €/sqm for unserviced built-up land, but 1.99 €/sqm for serviced land, where main engineering infrastructure is provided. In the same value zone 1, the LBV of industrial/agricultural enterprises land is 0.14 €/sqm, but LBV of

industrial/industrial enterprises land is 0.36 €/sqm for unserviced built-up land, but 1.14 €/sqm for serviced land.

If analysing official data about the case study area, significant differences in LBV may be identified. Accordingly, it is obvious that the land for residential and commercial use in value zone 1 is more than 6 times more valuable even if not serviced – no differences into field – than the land for agricultural use. Partly serviced (provided access and electricity) land for residential and commercial use in the same value zone is even more than 22 times more valuable than the land for agricultural use. The land of agricultural enterprise does not exceed in value the land for agricultural use significantly (approx.1.5 times) as all together it basically serves for the purpose of agricultural production. If differences in values between the same land use but at various value zones do not exceed 3 times, than those between partly serviced and unserviced at the same value zone exceeds 3 times. Thus it can be concluded here that the provision of necessary engineering infrastructure for appropriate land use plays more meaningful role in respect to the land value than the distance to the place the service is provided and settlement situated.

Municipal spatial plan has been designed for implementation during 2007–2019 (Ventspils novada pašvaldība, 2014). The implementation of the plan has to follow preconditions for development, development objectives and directions, existing policies and strategies, land use and building provisions with zoning for future uses (legally binding).

Thus, legally binding regulations of the municipality regarding land use and development determine necessary conditions for extension of urban containment, adjusting or avoiding physical land fragmentation, changes in land-use patterns, providing appropriate engineering infrastructure and standards as well as for ensuring necessary site development. Detailed plans should be developed and implemented to concretise and introduce above mentioned conditions. However, in the case study area, as the territory close to settlement border should not be designated as residential, it is suggested according to either local plan or detailed plan to solve land fragmentation and according to municipal spatial plan to change functional zoning and/or make readjustments in urban containment. Land use, size, ownership and values are inhomogeneous in the area. Land readjustments should be carried out through implementation of detailed plans.

3.2. The case of Germany

The selected case study is located near Bonn in North-Rhine-Westphalia, which is shaped by both a growing population and land fragmentation (Figure 3). The agricultural land is to be developed to urban land according to the municipal plan (Figure 4), namely to residential (single-family housing – MA) land use, mixed (residential and service – GE,) land use and industrial land use (MI).

The LBV in Germany are evaluated every to every second year and are available nationwide for agricultural/forest and already existing urban land (thus, the necessary infrastructure is already provided) by the committees of valuation experts (e.g. GAA NRW, 2017). The land

Figure 3: (left) Cadastral land units on orthophoto map.
Figure 4: (right) Municipal spatial plan.

values refer to zones with similar determining characteristics as location, accessibility, urban patterns etc. (Ortner and Weitkamp, 2018). The LBV are used in all of the three standardized property valuation methods that exist in Germany. However, the valuation of land at the same time is not standardized. Mostly, it is derived from purchases as in Latvia (Weitkamp et al., 2017). Since the value of agricultural land is valuated by income approach, the land quality is inherent in the land value.

The LBV of the rural land in the case study area is 2.8 €/sqm (the neighbouring zone is 4.5 €/sqm and thus of better soil quality; the comprehensive land use plan preserves this zone as agricultural land). The expected value of the developed land can be estimated by a comparison to similar zones in the same or neighbouring city. The responsible rating committee estimated the value for residential area with single-family houses 210 €/sqm, the mixed-use zone 170 €/sqm and industrial 60 €/sqm. The increase in value results from both the land use change and the necessarily previous land readjustment process forming the fragmented agricultural land to residential plots (Larsson, 1997).

Values for the above-mentioned classification with a designation 'unserviced built-up land' is not provided in Germany as a standard and only estimated in the land readjustment process. When developing fragmented rural to urban land, the standardised land readjustment process is used to form the fragmented land to parcels according to the municipal detailed plan. For the value capture (Hendricks et al., 2016) the LBV of 'unserviced built-up land' is estimated, mostly by derivation from LBV (Reuter, 2009). It is assumed here that it could be approx. 20% of the value of serviced built-up land. The longer the readjustment process lasts, the higher the value step. In the case study area, the values are defined as 45.5 €/sqm for residential land, 28 €/sqm for mixed-use land and 12 €/sqm for industrial land.

According to the National Building Code the detailed plan follows the concept of the comprehensive land use plan and is to be designed when it is necessary to guarantee the sustainable urban development. This should avoid speculative land development and urban sprawl. The comprehensive land use plan designates areas of agricultural land to be preserved and potential new urban land, but does not entitle the land use change. The detailed plan is

designed to be implemented as soon as possible, for example, by starting the land readjustment process. Land use according to the plan is legally binding, but is permitted not before the necessary infrastructure (wastewater disposal, electricity, accessible by rescue service) is provided. The land use change and thus the increase of land values depend on the success of land readjustment and provision of infrastructure. Nevertheless, the land fragmentation and possible arising challenges for the land readjustment process are usually not considered in the planning process.

4. Discussion

For the purpose to perform the analysis of causational relations as well as to identify comparable criteria and select variables appropriate to them, the model showing interrelation between fragmentation, functionality and development has been designed. These three landshaping attributes as relational objects are concerned with the objectives of the research. Therefore, *land fragmentation* has been seen as a challenging issue to be solved or adjusted to the proper purpose of land use, and thus to a single or several land use patterns. Land fragmentation can be characterised and explained by using available criteria in relation to a specific study area: (1) physical (internal) fragmentation of land plots designs the land structure in the area, (2) ownership fragmentation illustrates various owners in the area, and (3) activity fragmentation shows various land use patterns in the area. Fragmentation can be recognised as high, medium or negligible and measured applying indicators and their values, i.e. size, shape/configuration, compactness, distance, number of owners (private, state, municipality) per area, etc. The physical fragmentation is comparatively high in the case of Latvia, which harm to agricultural production in the area. At the same time, it grounds decisions for possible activity change. Due to lack of properly data, the ownership fragmentation was not analised. The activity fragmentation is negligible and it differs in spatial plan and in reality.

Multi-functionality has been seen as necessary condition to synergy, but used just some of all spectrum from case studies. Multi-functionality can be characterised and explained by using available criteria in spatial planning context: (1) it represents a combination of different socio-economic functions in the area, (2) it appears from activities of stakeholders representing the interests of various sectors, and (3) each functional zone of it is designed by various land use patterns. Functionality can be recognised as single, two, more than two and measured applying indicators and their values, i.e. land use patterns per total area, etc. Some indicators should be used here that have been systematised and proposed for assessment of land use by applying efficiency domain (Auziņš et al., 2014). There are several functionalities recognised in the case areas. In the case of Germany three new land use patterns are identified in relation to planned site development on the agricultural land. In the case of Latvia comparatively large area was planned for individual residential housing on the agricultural land. If comparing both cases, the necessary conditions for positive synergy lack in the case of Latvia.

Land/site development has been seen as value added to real property through benefit-cost assessment. Land development can be characterised and explained by using available criteria

under development scheme: (1) pre-development phase, referring to undeveloped land/existing land use, (2) development phase, referring to spatial planning as extension of land-related rights as well as to the construction of infrastructure, and (3) post-development phase, referring to continuing socio-economic development. Development can be recognised properly to phases and changes in land use intensity and measured applying indicators and their values, i.e. gained effects per consumed resources showing change in land value in general. Likewise, some indicators should be used here that have been systematised and proposed for assessment of land use by applying efficiency domain (Auziņš et al., 2014). In both cases the development phase shows extended rights through spatial planning without considerable investments in built infrastructure. Due to lack of properly data for benefit-cost analysis, the value added to real properties was not assessed. However, it must be admitted that the situation with planned residential housing but still existing agricultural morphology lasts comparatively long time in the case area of Latvia.

For the empirical analysis only LBV as comparable data were collected, therefore, a causational relation described in rather generalised way in this study. To achieve a sustainable urban development, urban containment needs to be expanded and adjusted to planned functionalities. Therefore, some land structure and engineering infrastructure could be affected as well. Although, for instance, the German Sustainability Strategy seeks to reduce the land development from agricultural to urban land use to "30 ha minus x per day by 2030" (The Federal Government, 2017: 14), the Federal Building Code encourages infill development and redevelopment inside the urban area and comprehensive land use plans allow urban development only within explicitly designated areas, many municipalities allow more development. Their detailed plans are often designed in contradiction to the comprehensive plan and thus to a sustainable concept. Participation of inhabitants and NGOs is guaranteed by law in the planning process, but the idea of a comprehensive development is then counteracted.

The quality, land use intensity of agricultural land as well as negative impact and externalities e.g. pollution, noise, damaged roads may influence decisions for residential development. In this context the trend towards multi-functionality and the need or potential for change in land use can be seen as internalization of negative externalities. When designing the comprehensive land use plan, the quality of agricultural land is assessed in Germany, but just assumed at best in Latvia. This quality indication should be used as one of the decision-making criteria whether the area will be designated urban land or preserved as agricultural land. However, in some urban areas the pressure of growth forces planners to ignore the value and the multi-functional use of this 'special' agricultural land, e.g. in Stuttgart (Kost and Kölking, 2017), and to designate residential areas to provide "affordable housing for all" (The Federal Government, 2017: 14). Agricultural land in Germany's fast-growing regions is the only land the value is determined by both the quality of soil and multi-functionality as well as the expectation of a non-agricultural use (Ache and Diers, 2016). In addition, the development of those rural to urban land causes arguments and long development processes, because the farmers take the development as expropriation and refuse the land readjustment, e.g. detailed plan "Oberstadion", Alp-Donau-Kreis.

The provision of engineering infrastructure is crucial for residential development and functioning of industrial and agricultural enterprises, but at the same time may negatively influence or destroy the infrastructure that is needed to capture the needed quality of agricultural land, e.g. amelioration and irrigation systems, roads to access the fields, product and material sheds.

Land fragmentation, in particular activity fragmentation, largely is related to fragmentation of land use patterns and landscape functions. Land fragmentation is supposed to cause deceleration of urban development in terms of both complicated processes of land reallocation and valuation, e.g. due to multi-functional land use.

Urban pressure from settlements and nearby surrounding of a city creates or influences demand for urban expansion and new development of sites. The improvement of land use conditions and development of engineering infrastructure influence a land value, administration of taxes and land value capture measures in the municipality. Another scope of multi-functionality refers to landscape functions to provide goods and services. It should be considered besides spatial/land use functions as they and related to them values also are influenced by landscape fragmentation and new developments.

5. Conclusion

Strategic urban planning is influenced by an institutional system of political, cultural, legal, ecological and economic aspects that need to be taken as additional background for comparative analysis. In general it is concluded that the choice of socio-institutional theory by its context is meaningful and appropriate for such kind of studies. Several key aspects indicate to causational relation between land fragmentation, land use functionality and land development:

- Land fragmentation in all recognised types has an impact on further development not only in rural context, e.g. agricultural and forest lands and as a consequence of land reforms, but also in urban context, e.g. urban fringes, peri-urban areas.
- If considering largely fragmented agricultural holdings and stakeholders' interests to keep the multi-functionality as it was planned in the area, the implementation of urban development would be improved.
- Land consolidation and land readjustment processes in Germany follows a comprehensive integrated approach, while in Latvia through simple real property formation procedures, which often relates to the implementation of detailed plans. Detailed plans cover just several land holdings instead of more comprehensive approach in Latvia.
- More fragmented ownership complicates and makes more expensive site development. Activity fragmentation should be adjusted to the needs of proposed infrastructure during the development phase of the land development process, as development essentially involves changes in land use.

- The impact (synergy) of multi-functionality to desired development can be assessed in the context of designing the land use plan, in broader territory by involving key stakeholders.
- The improvement of cooperation between planners and developers as well as institutionalisation (formal and informal) relates to the degree of benefits and synergies in the land development.

The coordination of spatial development and sectoral policy trends of the economy should be promoted at all levels of administration. Therefore, the guidelines should be developed and implemented for the promotion of spatial cohesion in the sense of compulsory analysis of the effects of spatial development and regular assessment at national level. Accordingly, the monitoring indicators could be identified for the assessment of the territorial impact. This would allow to carry out advanced and qualitative studies. For the assessment of the results of the implemented land-use policy measures, specific indicators that reveal underlying changes in the qualitative and quantitative content should be used for further research.

Acknowledgement

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Isabelle Adolphs*, Anja Jahn*, Alexandra Weitkamp*

Derelict Land – A Chance for Affordable Housing in Germany?

Abstract

Living space is scarce and expensive in most growing major Germany cities. Demand is greater than supply, especially in the lower priced market segment. In Germany, the ownership rate is very low, so the supply is covered mostly by the rental market. Especially in southern German cities like Munich or Heidelberg, the rents are in a height, that households, not only with low but progressively with middle incomes have problems to provide adequate and affordable housing on their own. Affordable in this context means that the household members get sufficient living space while spending maximum 30% of the households' income on housing.

The public sector reacts with a variety of regulative measures and financial support. In the first place, households get housing subsidies and secondly there exists object funding: investors are funded in developing social housing. But the classic instruments are often not sufficient, because the income ceilings are too low or the subsidies have been rather unattractive to investors in recent years. Thus, a lot of municipalities also use land-policy instruments. One of these instruments is the revitalization of derelict land. Especially in the segment of passive viable derelict land, a high potential for realizing more social housing in cities with high pressure on the housing market can be seen. A lot of municipalities, like Heidelberg, used their chances, when railway or military areas fell vacant and established affordable housing for low and middle-income households on former derelict land. However, potential building land alone is not sufficient to realize good housing projects – especially social housing. For the success of every project, the stakeholders and the way they get involved in the process is important. But this is difficult because of the great number of stakeholders, whose interests can differ; only with good cooperation and transparency, the revitalization can be target-oriented lead to success.

The following paper presents an overview of different approaches to solve the housing shortage problem of growing German cities with a high priced rental market. The paper focuses on so-called "threshold household". These are households with too much monthly income to get social housing subsidies, but not enough to provide adequate housing on their own. Existing literature was analysed to link different aspects and possibilities to create more affordable housing. Heidelberg is presented as a good example for realizing housing projects on derelict land. Within two projects a great amount of affordable housing for different income-levels – also for threshold households – was created.

* TU Dresden, Geodetic Institute, Chair of Land Management/Germany.

1. The situation of housing markets in growing German cities

German municipalities face different challenges due to different demographic developments. Increasing and decreasing municipalities are located next to each other (BBSR, 2015b). Especially big cities are recording population increases, while peripheral rural areas have to address population losses.

Demographic tendencies affect local housing markets in different ways. While the shrinking rural areas have to handle vacancies and mostly declining real estate prices, the pressure advances in increasing cities because of rising rents and housing prices as well as the shortage of buildingland potential. This heterogeneous situation leads to the problem to initiate federal or state programs for both, shrinking and prospering municipalities. Local programs and concepts are crucial because of their expedient adaptability on local circumstances.

Assessing the situation of growing cities, which is going to be analysed in the following paper, supply and demand of housing markets have to be considered. High demand in combination with low supply in the demanding segment leads, in a simplified scheme, to rising prices.

1.1. Housing demand

In many major German cities, the demand for inner-city housing is increasing because of population growth. This is due to positive migration balances as cities' fertility rates still remain negative (BBSR, 2012). Furthermore, the number of households has increased (1991: 35'256'000, 2016: 40'960'000) (DESTATIS, 2016), but the population has not risen to the same extent (1991: 80'274'564, 2015: 82'175'684) (DESTATIS, 2018). For example, the household size has fallen from 2.3 in 1991 to 2.0 in 2015 (BIB, 2017) (cf. fig. 1).

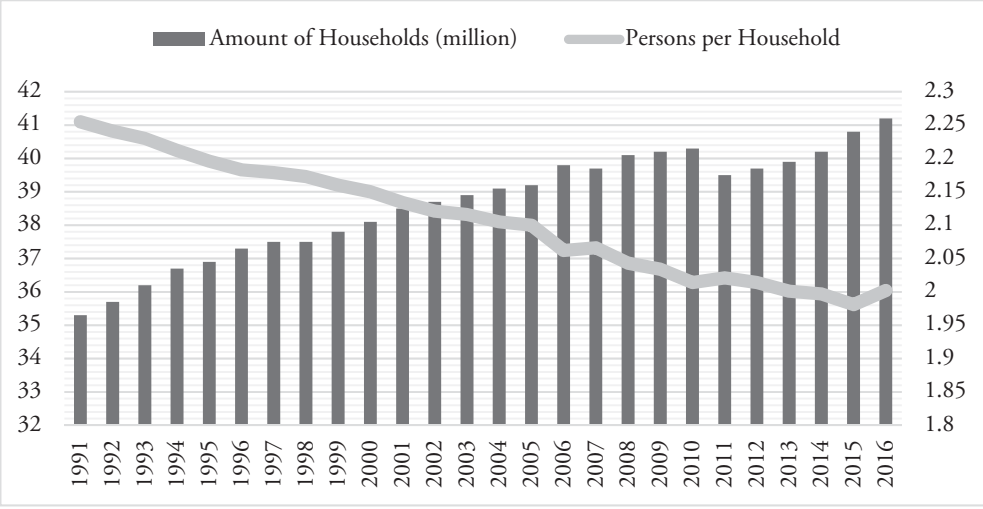

Figure 1: Living space per capita increased 2000 to 2014 from 39,5 sqm to 46,5 sqm (based on BIB, 2017).

A large number of population groups with different income levels are moving to the cities. In Germany, major cities around 50% of the population earn less than 1'500 € per month (Bertelsmann Stiftung, 2018). This group of low incomes can further be categorised. In addition to the young adults moving to the cities for education, many pensioners also want to live in the city, because on the one hand there are shorter ways to cover the daily needs and on the other hand the medical care is better than in many rural regions. Another group of people is wanting to take advantage of the city's benefits are migrants who are looking for jobs as well as being close to their compatriots. Due to the increasing singularizing of the population, the proportion of one-person households is increasing significantly and more apartments, especially small apartments, are in demand.

In addition to low-income households, middle-income households are increasingly having problems finding adequate housing in cities with high housing prices. This newly refocused group can be described as "threshold households" as it is bordering on households whose income is sufficient to cover housing costs. However, threshold households are not easy to characterize, as their affiliation with this group depends on income and housing costs. In particular, the housing costs and the supply of housing dependents greatly of community.

1.2. Housing supply

Looking to the housing supply, the rental market is very important in Germany, because of the low ownership quota. With only around 50%, the quota is low in comparison to other European countries. Only in Switzerland, fewer people are living in a property. In German cities, the quota is significantly lower than the federal average: according to census 2011, in

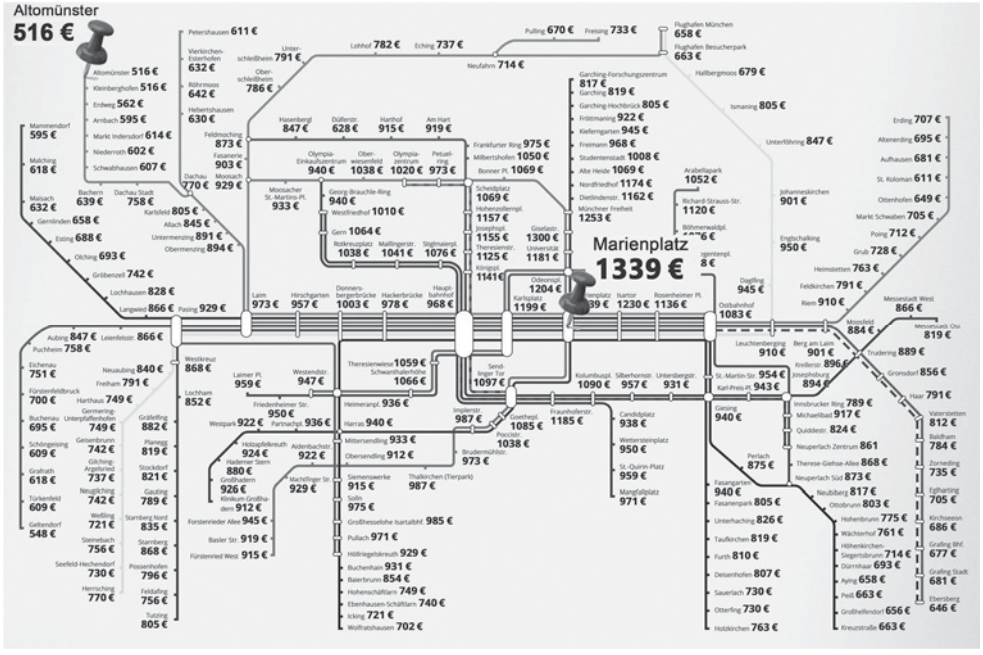

Figure 2: Rental Map of Munich (according to Immobilienscout24).

Munich and Stuttgart, only 21% of the inhabitants live in own property, in Heidelberg the quota is 22% and in Cologne 24% (Statistische Ämter des Bundes und der Länder, 2014). Thus, the rental market is particularly important, especially in German major cities.

Particularly in southern cities in Germany, the rental prices are increasing constantly (Empirica Institut, 2017): notable is Munich (according to BBSR, 2015a). The pressure on the Munich housing market is rising steadily: between 2010 and 2015, the population increased by 8.2% and the rents rose about 30% (Statista, 2017b). Figure 2 presents an overview of rental prices in Munich and surrounding municipalities. The metro-network is used for visualizing the monthly rent of a 30-year-old two-bedroom apartment with 70sqm. It can be seen that prices are falling with increasing distance to the city centre. In the city centre "Marienplatz" the highest rental prices can be found with 1'330 EUR. Otherwise, in Altomünster, a small municipality 50km away from Munich city centre and with nearly 8'000 inhabitants, the rental price is about 516 EUR. Although, in Altomünster the rental prices are higher, then the federal average of 458 EUR (all prices refer to 2016).

In Germany, about 35% of all 40 million apartments are rented out by private small providers – around 63% of all rentals. This makes public intervention difficult as the group of small private providers is very heterogeneous. The proportion of professional providers is only around 36%. Private companies account for a total share of 13%. Municipalities and municipal housing associations hold a housing stock of 2.3 million residential units, which corresponds to a share of 10% (cf. fig 3).

In addition to the difficulties in implementing changes in the stock, there are only a few new building activities in the last decades. The number of completions between 1995 and 2009 declined steadily. Only in recent years, the construction completions increase again

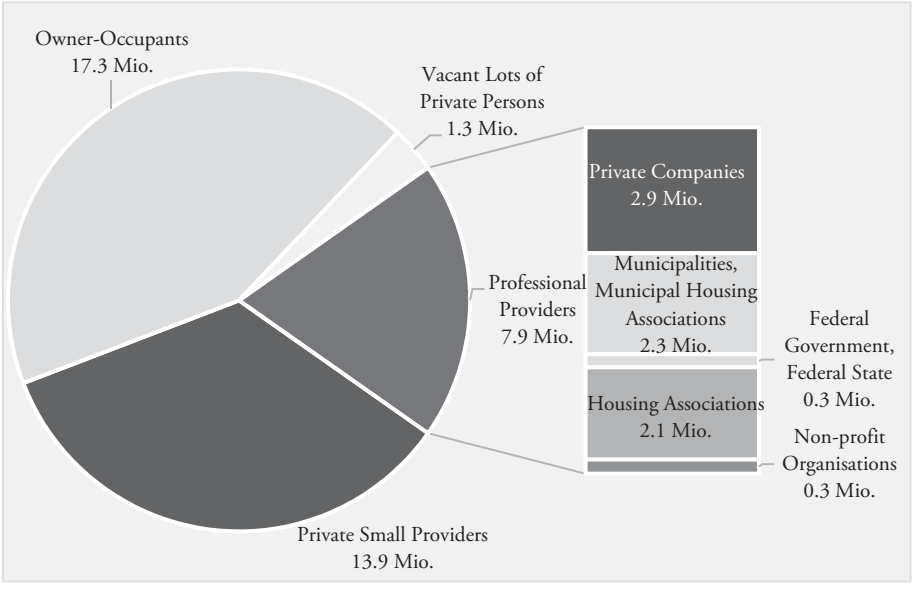

Figure 3: German Housing Stock in 2014 (according to BBSR 2016).

moderately. According to BMUB (2017), by the year 2020, around 350'000 homes in Germany would have to be built annually to meet the growing demand for affordable housing. If the market is left to the free play of the forces, high-priced housing projects would be mostly realized because the profit margin for luxury apartments is higher than for the construction of social housing. Only municipal housing associations and housing cooperatives would be building low-cost apartments of their own accord. The group of private small providers is not interested in building social housing or selling occupancy rights. Thus, the necessary amount of affordable housing cannot be covered by the municipal housing stock.

The existing supply and the current demand for housing are not suitable for all market segments and demand groups. The demand for affordable apartments exceeds supply in most of the major German cities. As a result, low-income and increasingly middle-income households have problems providing adequate housing for their own resources. Adequate means that there is sufficient living space available to every member of the household. This adequacy is defined by the municipalities and published as "square meters per household member". However, in order to close the existing gap between supply and demand, there are a variety of financial support options at state and local level.

2. Supporting affordable housing

Summarizing, a threshold household is defined by the proportion of housing costs (rents, ancillary costs, etc.) to their income (Klein and Weitkamp, 2017). These parameters differ spatially. The higher the rent level in a city, the more of the monthly income a household has to spend on housing. The proportion of the population, which has only a low income (here also the limit values vary), lies in the German cities at about 50%.

At the federal level, housing subsidies provide an established instrument for promoting low-income households. Housing subsidies are a form of *individual promotion*. The eligible households receive a financial contribution towards their monthly housing costs. However, income ceilings set for the grant must be respected. If the income of a household lies above these income limits, it receives no housing subsidies. With the reform of federalism in 2006, the competence for the promotion of housing was transferred from the federal government to the federal states. Some federal states have issued their own housing promotion laws. In federal states that have not yet created their own legal basis, federal law continues to apply.

Because of the high rents, also the middle class get difficulties to finance adequate housing. In Bavaria, for example, the income ceilings were raised as the state government determined that they were too low compared to the rental level. In addition, the city of Munich raised the income limits for entitlement to housing subsidies furthermore because of the high rents, so now between 50% and 60% of the population of Munich have a legal entitlement.

In addition to the individual promotion, *subsidies for construction and renovation* exists, which are aimed at investors in the housing segment. Subsidies will fund the construction of social housing and thus secure the stock of social housing for persons who have a certificate required to live in apartments built by using state subsidies. However, this form of

support has been used very little in recent decades because of its unattractiveness – there was no financial merit of building social housing, because of the high demand and the greater profit. As a result, the proportion of social housing of the total housing stock is declining. Many of the apartments are currently getting out of these bounds and are available again on the free rental market or becoming property.

A large number of major German cities have recognized that the federal and state funding programs and statutory regulations are no longer sufficient to support the local population. Therefore, some cities have developed and implemented their own funding concepts. In addition to financial instruments, the municipalities also use a variety of land policy instruments (Drixler et al., 2014). In times of meagre public funding, the financial resources of cities are usually limited. Therefore, in the last decade, especially building land strategies gained importance. The municipalities use the instrument of *urban contracts* (German Federal Building Law, Section 11) to involve investors in the costs of planning and development and to create a share of social housing in the project (Weitkamp et al., 2017).

Most of the possibilities for creating new living space – especially for threshold households – only apply for the designation of building land. Therefore, the amount of potential building land has to be exhausted. Some major cities, like Heidelberg for example, have the advantage of disposing derelict land. The development of such areas in combination with financial subsidies or land-policy instruments has great potential for the creation of affordable housing. However, not all brownfields can be equally revitalized. The revitalization of derelict land, e.g. because of contamination, previously did not appear to be suitable as potential land for new building activities due to its location or pre-stress. Now, it will be increasingly important for prospering cities. Even for investors, some sites of derelict land become interesting in the context of rising land values. If public sector would compensate the unprofitable costs (financial support), many areas will become interesting for private investors as well. In addition to the definition, the following section discusses the categorization of derelict land, as well as the possibilities and limitations of brownfield revitalization with regard to support affordable housing.

3. Derelict land as a chance for affordable housing

The revitalization of derelict land is a good instrument in the sense of a sustainable development of building land and its economical handling. The term “derelict land” is not conclusively defined. The understanding of derelict land or brownfields differs internationally. While in the United Kingdom (UK) the understanding is similar to those in Germany, the perspective differs significantly, for example in the USA. In Germany, there is no legal definition. Germany follows this understanding of derelict land: an industry brownfield is an area, which is affected by industrial or similar development and is not usable without a previous preparation (Environment Agency, 2002; Ferber, 1997). But also minor used industry or commercial areas are designated as derelict land, because of the missing optimal exploitation (Kahnert and Rudowski, 1999).

Also, if the understanding of derelict land is associated with contaminations, not each site of derelict land is burdened. For example, a school site is not needed anymore because of demographic change and no other use can be found, the site is designated as derelict land according to German understanding. And the detection of contamination does not mean, that a site is derelict. A lot of sites are in economic use despite contaminations (Weitkamp, 2013; 2008).

3.1. Types of derelict land

Not each site of derelict land is equal to another one. They have to be differentiated; criteria might be their spatial location in region and municipality, former and further use, and revitalization costs. There are different ways of categorization. The most common ones will be given ongoing.

Derelict land can be differentiated according to their original context in big industrial sites of derelict land, small commercial sites of derelict land, vacancies of public infrastructure, military conversation areas and eroding commercial areas or conglomerations (Koll-Schretzenmayr, 2000).

Besides, derelict land could be differentiated spatially. The origin of their existence differs depending on the region: derelict land in

- Traditional industry regions (caused by structural changes),
- Metropolises (caused by structural changes, especially increase of service society and migration of industry in the periphery) and
- Rural areas (caused by the abandonment of agricultural use, forestry use or mining).

The revitalization of derelict land means the reintegration of land in an economic circle with planning and land policy as well as financial instruments (Kahnert and Rudowski, 1999). Depending on the type of derelict land, the effort for activation and the potential investors (public or private) vary.

According to the economy, three types of derelict land can be differentiated (cf. fig. 4) (Weitkamp, 2008).

Category 1 consists of commercially attractive sites. They will be developed normally on their own. They are also named as "viable by itself" (Difu, 2007). They are of local or regional importance. Their market values are high with low remediation costs: the development can be financed from the caused land value increase. There is no need of subsidies.

Category 2 and category 3 are passively viable. They are locally and regionally important and have a special development potential. Besides, the development is related to a certain risk (Ferber and Grimski, 2002). Revenue (land value of re-use) and cost correspond within Break-Even-Point (barely viable: category 2). If revenues do not cover the expenses, the site is not viable (category 3) without compensation. The development needs help from planning and in particular by subsidies (English Partnerships, 2003).

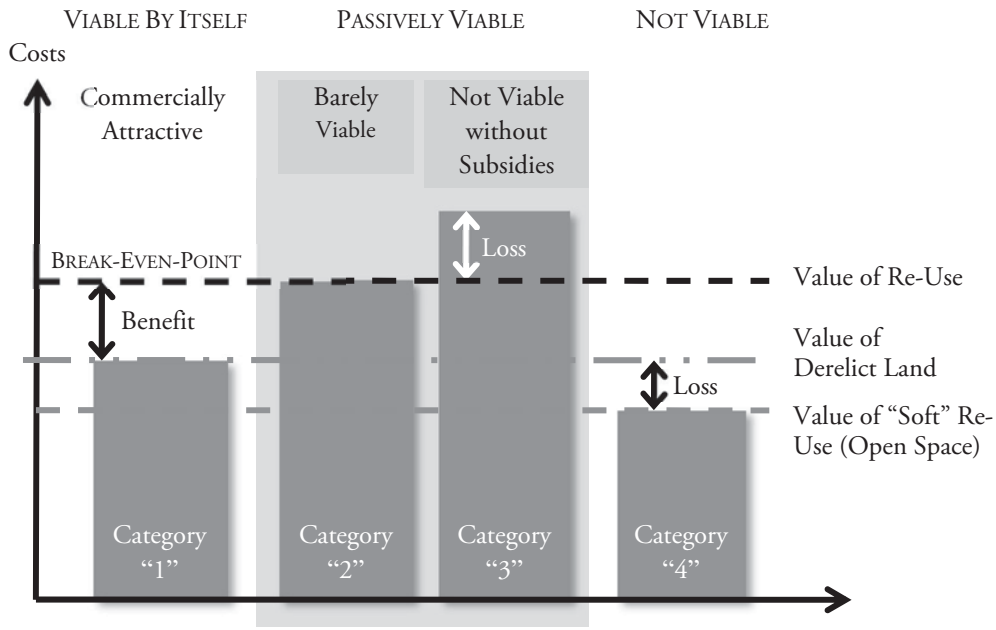

Figure 4: Types of derelict land (Weitkamp 2008).

Category 4 implies the not viable sites for a foreseeable future. The sites can often be found in mono-structured industry regions without development potential. A lot of derelict lands is surrounding the site, which is altogether problematic for the whole region. In addition to the low land value, there are high remediation costs. An autarky development is not possible (Ferber and Grimski, 2002). They are normally only suitable for a soft re-use like open spaces (release of an economic circle). These sites won't normally be developed by private investors (English Partnerships, 2003).

Particularly with regard to the potential of derelict land to reduce the housing pressure, categories 1 to 3 are relevant. Cities without housing pressure are not willing to develop areas from category 2 or 3, because the need is not given. But in growing cities with high pressure as a consequence of increased demand, the category 2 and 3 become interesting too. Especially in these cities, the Break-Even-Point is higher, since the benefit of the development is higher.

However, in the context of brownfield revitalization, not only such economic factors are important – they just provide the order in which derelict land can be used for revitalization. In the context of brownfield revitalization, there are also subjective factors that determine the success of the revitalization of an area. "Communication between all involved actors" and "participation processes" are keywords in this regard, which play a crucial role in brownfield revitalization. These things that are increasingly deciding on the success. Therefore, the focus of the following section is on the actors involved with their predominant interests.

3.2. Stakeholders in revitalization of derelict land

A lot of different stakeholders are involved in revitalizing derelict land (according to Jeschke et al., 2016; Jeschke and Weitkamp, 2017). Therefore, the integration of stakeholders into development processes is one of the most important aspects of process control. The constellation of stakeholders can be different from project to project and the stakeholders can pursue different interests within the project. Table 1 shows that not all stakeholders are involved during the whole process.

Table 1: Stakeholders within the course of a project (according to Alda and Hirschner, 2016; Kochendörfer et al., 2010)

Stakeholders	Phase until Investment Decision	Conception/ Planning	Realization	Marketing	Use
Investors	X	X	X	X	(X)
Financial Institutes/ Insurances	(X)	X		X	
Project Developers	X	X	X	X	
Authorities	X	X			
Planers/Consultants	X	X	X	X	
Acting Companies			X		
User		(X)		X	X
Previous Owner	X				

Each group of stakeholders pursue particular objectives, which are usually not identical and sometimes contrary. The *investor* defines the aims of the project and ensures financing. He bears the development risk, which plays an important role in the revitalization of derelict land. The objectives of the investor are low development costs, high-quality standard and short development period (Steffens et al., 2006). The investors are focused on profit. However, investors sometimes pursue projects with a low-profit-margin if it is related to a special reputation or suitable as a reference for future orders.

In relation to the financial perspective *financial institutes* and *insurances* play a key role. Financial institutes are mainly responsible for lending. Their interest is about finance volume and security of the project (small risk). The insurances pay parts of the cost and reduce investors' risk. The aim is to keep the cost as low as possible (Steffens et al., 2006).

In many cases, the *project developer* is also the investor. According to Kochendörfer et al. (2010), he provides and develops the concept. He has to adjust the ideas of planning with the municipality and the investor. The objective of the project developer is to get the security of planning at an early stage (Steffens et al., 2006). Further tasks are securing of financing by

the investor, the preparation of permits, the realization as well as the marketing and leasing after completion (Kochendörfer et al., 2010). He ensures that each stakeholder is involved in the process and the actions are coordinated (Steffens et al., 2006).

Another stakeholder, with regard to revitalizing of derelict land, is the *municipality*. Within this group, we have to differ between the *administration* and the *political level – at least in Germany*. Last mentioned has a special role at the beginning of the project. In Germany, the approval of the political decision-makers (city or local councils) is required. Corresponding technical committees prepare a recommendation for the revitalization of the derelict land. If the revitalization is not supported by the political level, it is doomed to fail. Politics are based on common weal. But it is also possible, that, with regard to the own re-election, the favourable self-presentation can be followed as well. Furthermore, the project has to be financeable of public budget (Steffens et al., 2006). The administration is a stakeholder because of the regularly need for land-use planning and permits (Kochendörfer et al., 2010). The municipality is interested in a sustainable reuse of derelict land.

The *public*, in particular neighbours and residents, has also to be involved in the process as a stakeholder. The negative appearance of derelict land can influence the neighbourhood; declining real estate values and abandonment are possible consequences (Kahnert and Rudowski, 1999). Publics' aims are maintenance and improvement of living quality as well as assurance of health and property. It is a very powerful stakeholder in the revitalization process and should be convinced of the added value as far as possible (Steffens et al., 2006). Furthermore, the development of derelict land is geared towards a special *group of users* and sometimes their needs cannot be judged by the developers. So, it can be important to integrate the future users in revitalization processes (Kochendörfer et al., 2010). Protests against the project can lead to a delay in development or even to a cancellation of the project.

Besides the mentioned stakeholders, *planners* and *consultants* can be involved in certain phases of revitalization, if necessary.

At the beginning of revitalization, the *previous owners* are important stakeholders. They want to achieve the best price possible. Thereby, conflicts arise regularly because of different expectation of the value. Besides this, they seek an exemption from liability issues in case of a contaminated derelict land (Steffens et al., 2006).

Summarizing different facets of objectives can be observed within revitalization of derelict land. Also, stakeholders evaluate particular parts of objectives in different ways. Thereby, stakeholders rarely act independently from each other. Nevertheless, nearly all want to develop the derelict land. Thus, successful revitalization should be a consensual proceeding. Hereafter, a best practice of revitalization derelict land to reduce housing pressure, especially for affordable housing, is given.

4. Revitalizing derelict land by creating affordable housing at the example of Heidelberg

Major cities with growing pressure on the housing market attempt to detect and use potentials with regard to inner development. Heidelberg has around 150'000 inhabitants with

nearly 40'000 students. In addition to the inhabitants, the students are looking for affordable rental apartments. The supply is scarce and the rents have been rising steadily for many years. Heidelberg is because of the high rents one of the most expensive German cities. To enable also threshold households a life in the city, Heidelberg tries to offer affordable housing by residential construction. The advantage of Heidelberg is the availability of nearly 300 hectares of derelict land on former railway sites and conversion areas.

The abandonment of many military sites causes the large land potential, which has emerged in some major German cities. In 2014, the US Army completely vacated its locations in a lot of German cities, e.g. Heidelberg – a total of around 180 hectares on five sites (Konversion Heidelberg, 2018). The areas became the property of the Federal Republic of Germany and were sold to a subsidiary of the city of Heidelberg. One priority for the development will be the creation of affordable housing. On the site of the former "Mark Twain Village" primarily residential use for households with different income levels is intended: 70% of the resulting housing should be offered as low-priced condominiums or as rental housing for prices between 5.50 and 8 EUR per sqm – 30% are reserved for threshold households (Heidelberg, 2017). In 2017 the average rental price in Heidelberg was around 11.50 EUR per sqm (Statista, 2017a). Urban development is increasingly taking place in former railway areas. Thus, the city of Heidelberg is developing a new district on an unused railway site on 116 hectares – the so-called "Bahnstadt" (Engl. Railway-City). 3'700 new residential units are planned. 20% are subsidized apartments, sectioned into rental apartments and condominiums for households with different incomes. Also, around 7'000 new jobs are supposed to arise on the site.

For the city of Heidelberg urban development should be sustainable and people-oriented. The aim of the city is to inform the public in an early stage as well as to integrate the public in development and planning. Therefore, the development of the conversion area takes place in a dialogical planning process (planning in dialogue) (Planung im Dialog, 2018). For the "Bahnstadt" a similar way of cooperation was chosen. All important stakeholders (citizens, associations and institutions, economy, administration and politics) were intensively involved in the process. In the beginning, ideas and suggestions from the public were collected (Bürgerbeteiligung, 2018). This is done by an advisory council on development, which had to pick up, summarize and professionally translate the citizenships' ideas and suggestions (Entwicklungsbeirat, 2018; Planung im Dialog, 2018). The results of the first step were presented to the citizenship and the local politics. Subsequently, the advisory council appropriated recommendations and prepare decisions for the local politics. The department of development management coordinates the work of the advisory council and the conversion committee makes the decisions, which focuses on all issues concerning conversion (Konversionsausschuss, 2018).

The advisory council on development has a special role in the planning process. It consists of 34 people from different spheres, for example, politics, real estate economy, chambers and other various lobbies (e.g. science, culture, different associations). The advisory council is a so-called intermediary organization, the link between citizens and public on the one

hand and the administration and politics on the other hand. It organises information and participation events with the citizens. The results are passed to administration and politics (Entwicklungsbeirat, 2018). Therefore, the advisory council is an important stakeholder in the revitalization, not only a moderator even a mediator, helping to push the process.

Because of exchange of ideas and information between all relevant stakeholders and the transparency of the whole process, the revitalization in Heidelberg can be seen as a best practice regarding stakeholders acting with a broad consensus of urban society (Planung im Dialog, 2018). With regard to the rental price level, Heidelberg is a German city with high pressure on the housing market. But Heidelberg has the advantage of a great amount of derelict land with the former railway site and the conversion areas. Within the revitalization new living space – also for threshold households was built. Both projects were well-functioning, not least through the way all stakeholders were integrated.

5. Conclusion

In high-price cities, more and more middle-income households are facing housing problems. In addition to the social housing subsidies provided by the federal states, many major German cities use land-policy instruments to actively intervene in the housing market and thus to serve also threshold households with adequate and reasonably priced housing. Besides potentials for e.g. densification in small building gaps or on rooftops, new housing construction is necessary. In the last decades, the derelict land was not attractive for investors, because of possible contamination and the correlated risk of high costs. State funding was often needed for passive viable sites. Due to increasing land prices and the high pressure on housing markets, these areas are getting now in focus for housing construction. The revitalization of derelict land offers also the opportunity to create affordable housing, such as in Heidelberg. For a successful revitalization project, the support from the local population is needed. A good and above all equal participation of all stakeholders, as well as a good transparency of information, ensure a fluent process. Some cities have realized that support from the citizens can be a key success factor, as there are already examples of failed or delayed urban development projects.

The revitalization of derelict land to create affordable housing offers a great chance to face the housing shortage, especially in the low-priced segment. However, the problem cannot be solved only by derelict land, because the potential sites in the cities are limited. To remedy this abuse a mix of different land-policy instruments on different political levels is needed.

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Tine Köhler*, Alexandra Weitkamp**, Hamza Alkhatib***

Quantifying Spatial Spillover Effects of Urban Restructuring

A methodical approach

Abstract

Some instruments in land management refer to the concept of value capture and thus allow public agencies to capture the direct beneficiaries or positive externalities of (urban) development. Those instruments are used for urban growth, whilst measures of urban restructuring (e.g., abolishment of vacant housing) need to be funded by governmental subsidies. The lack of financing is an additional obstacle of urban restructuring. This paper stresses a methodical approach for quantifying spatial spillover effects of urban restructuring and their spatial distribution. Since the distance is considered not to be the only determining variable, but the type of neighbourhood is as well, neighbourhoods are clustered by their shaping attributes first.

1. Introduction

Different instruments of land management refer to the "concept of public value capture, which can be seen as a method or a strategy to capture value increase to use it for specific purposes" (Hendricks et al., 2016). In the German land reallocation process, for example, the captured value is used for refinancing invested expenses. A similar procedure can be found in the urban redevelopment when following the German Building Code (urban redevelpment measures, §§ 136 et seqq.): some property owners benefit from the redevelopment on the account of others, so the value increase is captured to balance the expenses. Generally, the principle of value capturing requires the value increase due to measures that enhance the capabilities of land owners. Unfortunately, many European countries face a declining population and thus a growing number of vacant housing (Berndgen et al., 2018). If urban development and land management are guided by the concept of sustainability, they need to deal with those housing stock, for long-lasting vacancy causes a loss of property values (Lerbs, 2014), the inefficient use of technical infrastructure can narrow or even destroy the urban pattern. The German programme "Stadtumbau" (urban restructuring measure) seeks "to create sustainable urban development structures in areas affected by considerable loss of urban development function" (§§ 171a II BauGB), namely the removal of empty

* Frankfurt University of Applied Sciences, Faculty of Architecture, Civil Engineering and Geomatics, Chair of Land Management/Germany.

** TU Dresden, Geodetic Institute, Chair of Land Management/Germany.

*** Leibniz Universität Hannover, Geodetic Institute, Engineering Geodesy and Geodetic Data Analysis/Germany.

housing. However, this programme is of limited duration and made for urban city centres and their apartment buildings. Smaller cities and towns could not benefit from the programme (BMVBS, 2012; Bernt, 2002), because they are shaped by single-family housing. However, the concept of sustainability and especially the implementation of the SDG 11, Habitat III and the New Urban Agenda (NUA) require the management of declining growth in small towns as well. One reason why municipalities are reluctant to reduce their building stock are the missing financial opportunities. Several instruments have been discussed to improve the urban restructuring in small towns, for example, an approach similar to the established Emissions trading (UBA, 2009). All concepts necessitate an additional administrative framework and would narrow the municipality's rights. In addition, they are based on funding gained from growth (value capturing mechanism or direct funding). Regions facing decline need instruments not dependent on growth. Nevertheless, the model of value capturing could be used for the development of such a new instrument if spatial spillovers were taken into account.

Value capture is based on the idea to capture the unearned profit (increased land values) for private land owners resulting from public investments. However, the model allows the public authority only to tax the direct beneficiaries within a definite area (e.g., within a planning area). The main idea of this paper is that the spatial spillovers of urban restructuring measures could be captured for funding the restructuring. Spillovers are taken into account in knowledge- and marketing research (Rossi-Hansberg et al., 2010; Vega and Elhorst, 2013), but are so far neglected in land management processes (Frielinghaus, 2011). However, spatial spillovers could arise as both negative externalities (vacancy in building stock) from urban development and positive externalities from urban restructuring and appreciation. To capture these land value increases, it is necessary to quantify the impact spatially (extension/spread) and in scope (quantity in different neighbourhoods).

Rossi-Hansberg et al. (2010) show for Richmond, Virginia, externalities of urban revitalisation measures of 2–5% in land prices (declining with distance from the impact area). They estimate that the effect depends on the scope of the revitalization programme. However, the study does not consider differences in urban patterns, demographics or land use in the neighbourhoods. We state the hypothesis that the revitalisation's impact correlates with the similarity of neighbourhoods. In addition, we suppose a difference between urban and peri-urban/rural areas due to the urban density: in regions showing dispersed urban patterns the decline in externalities in space is non-linear, but also corresponds to the similarity of neighbourhoods. This is why we suggest to find different types of neighbourhoods by clustering their determining variables (cf. 2.1).

Lin et al. (2009) investigate the spatial spillovers of foreclosures using a hedonic approach model considering spatial and temporal distances. Grout et al. (2011) figure out the treatment effects of the Portland-Oregon Urban Growth Boundaries that put into right to reduce urban sprawl, on property values. They support an analysis model, that is not biased by endogeneity of performance (here: regression discontinuity design), instead of the typically

used approaches (e.g., Feng and Humphreys, 2008; Irwin, 2002) since they include governmental regulations as exogenous regressors, the hedonic approach "is likely to be invalid if the parcel characteristics that determine property values also influence the government's decision about how to implement regulations." (Grout et al., 2011: 98). The regression models address this endogeneity.

This paper deals with the methodologies of modelling spatial spillover effects of urban redevelopment measures. These modelling approaches need to detect spillover effects on market values. The spillover effect should be verifiable in different locations with different extent. Spill over effects should be quantified in scope and spatial distribution. All methods should also comply with the requirements of analysis in areas with few transactions (cf. Weitkamp and Alkhatib, 2014).

2. Presentation of methods

The paper presents methods to quantify scope and spatial distribution of residential externalities to use those spillovers for value capture. For this purpose, the impact of different revitalisation measures is investigated by a quasi-experiment. Based on a classification of neighbourhoods, we explore differences in effects that are not distance-dependent (fig. 1).

2.1. Classification of neighbourhoods

Previous works (Lin et al., 2009; Grout et al., 2011) are based on a first-order neighbourhood matrix (Anselin, 1995) considering the distance-dependent decrease of spillovers popular in regional economics (Audretsch and Feldmann, 2004; Fritsch, 2004). However, Tobler's first law of geography or the geographical gravity model are considered not to be appropriate, due to spatial patterns or spatially inherent processes that would affect the relation (topography, accessibility, demographics etc.). Thus, statistical analyses are to be mapped (Matthews and Yang, 2012) and types of neighbourhoods classified by determining attributes.

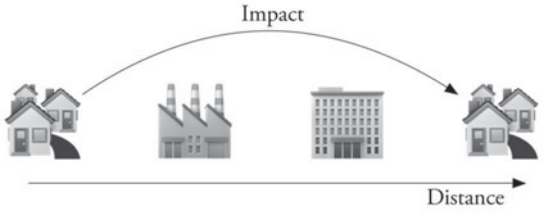

Figure 1: Idea of spillover effects.

In the first step neighbourhoods are classified by their urban form as density and building type. The analysis of urban form is an interdisciplinary research topic with a long-standing tradition all over the world (Whitehand, 2007). Conzen (1960) developed a town-plan analysis approach that still influences the studies of urban morphology of the 'classical' cultural geography (Lilley, 2000; Whitehand, 2001 and 2003). However, urban morphology and space syntax approaches became less important with the 'cultural turn' in geography (Barnes, 2001; Barnett, 1998). Nevertheless, the classification of buildings by the urban morphology

(building form, building size, density) is still appropriate in this case as the similarity in urban morphology indicates a similarity in use, age and some socio-economic criteria (Schiller, 2010). Hecht (2014) developed an automatic classification of building footprints computing geospatial data. Using this method, the neighbourhoods in the case study areas will be classified. In a second step, further attributes used for the following regression are explored.

The data on purchases show a sample of attributes (indicated by both, latent and manifest variables) such as:

- use (primary living, partly mixed with e.g. working, recreation space)
- property type (detached/semi-detached, floors, bedrooms, garden etc.)
- urban patterns (urban density, restrictions) and
- location (accessibility of public transport, green infrastructure, schools, noise)

However, further attributes need to be considered (Wuestenrot Stiftung, 2012) as special features such as demographics.

The following questions arise:

1. Can different housing structures and their locations be clustered by the urban morphology? Which type of information is needed?
2. Is it possible to determine spillover effects by empirical data? And in which spatial dimension do these effects appear?
3. Can spillover effects be quantified in a way that thresholds can be determined, which could be used in an urban calculation or for compensation of benefits and losses?

Geo-statistical models such as the geographically-weighted regression (Fotheringham et al., 2002) are not used yet for the quantification of spatial spillovers of urban revitalisation.

2.2. Regression approaches

First, the hedonic **Linear Regression Model** (1/see table 1 A) is applied:

$$(1)\ \boldsymbol{y} = \boldsymbol{X\beta} + \boldsymbol{\varepsilon}$$

In equation (1), $\boldsymbol{y}$ is a vector of the dependent variables, $\mathbf{X}$ is a full rank design matrix design matrix of independent or the explanatory variables, $\boldsymbol{\beta}$ is the vector of unknown regression coefficients and $\boldsymbol{\varepsilon}$ is vector of residuals or the error term (cf. Zhang et al., 2009). Simple spatial information is integrated in design matrix as independent variable (e.g. as distance to a location). If the standard assumptions are valid (heteroscedasticity and autocorrelation do not exist) the regression coefficients $\boldsymbol{\beta}$ can be estimated with the method of ordinary least squares (cf. Eckey et al., 2004: 19).

A further development is the **Mixed Linear Model** (B) (also known as universal kriging or least squares collocation model (cf. Zaddach and Alkhatib, 2014):

$$(2)\ \boldsymbol{y} = \boldsymbol{X\beta} + \boldsymbol{Rs} + \boldsymbol{v}$$

which comprises an extension with regard to the linear regression model. The vector of dependent variables $\boldsymbol{y}$ can be splited into a regular systematic component $\boldsymbol{X\beta}$ (called trend), an irregular random component (called signal) $\boldsymbol{Rs}$ and an irregular random component (noise) $\boldsymbol{v}$. In case of missing knowledge between trend and signal components, the matrix $\mathbf{R}$ is chosen to be the identity matrix $\mathbf{I}$. In this case the approach given in (3) is called simple collocation:

$$(3)\ \boldsymbol{y} = \boldsymbol{X\beta} + \boldsymbol{s} + \boldsymbol{v}$$

For estimation of $\boldsymbol{\beta}$, a maximum likelihood approach can be used.

However, local-specific contexts might cause spatial autocorrelations (dependence of disturbance variables from spatial examination units). Spatial autocorrelations can violate the statistical requirements for linear regression models which leads consequencetly to biased valuators and therefore to an invalidity of significance tests. To improve the model adjustment, autoregressive models should be used simultaneously; precisely the spatial lag model and – for evaluation – the spatial error model (Zhang et al., 2009). An essential component of such models is the spatial weight matrix ($\boldsymbol{W}$), which is determined by the definition and weighting of the spatial neighbourhoods. The neighbourhood matrix bases either on the distances between the districts or on a binary matrix. Latter one can be developed more easily, but will not be used here, because binary coding refers only to two adjacent districts, which is not always given in the following case (cf. models of migration).

In case of a **Spatial Lag Model** (4/C) the autocorrelation is integrated. If spatial autocorrelation appears, spatial lags may be implied in one or various independent variables ($\boldsymbol{X}$) in equation (3). This approach assumes that exogenous variables affect the dependent variable $\boldsymbol{y}$ in the same district, and also in other districts. Therefore, the spatial autocorrelations will be integrated in a separate variable, which consists of the spatial autocorrelation coefficient and of the spatial weighted neighbourhood matrix $\boldsymbol{W}$ (Kissling and Carl, 2008) (4). The appropriate model, in which spatial lags are implied in all exogenous variables, is as follows:

$$(4)\ \boldsymbol{y} = \boldsymbol{X\beta} + \boldsymbol{\rho W y} + \boldsymbol{u}.$$

$\boldsymbol{W}$ is the standardized row-sum weight matrix, $\boldsymbol{\rho}$ the spatial autocorrelation parameter, and $\boldsymbol{u}$ the residuals. The dependent variable $\boldsymbol{y}$ is not only explainable by the stationary data $\boldsymbol{X}$, but also by the neighbouring locations of $\boldsymbol{X}$. $\boldsymbol{Wy}$ represents the weighted averages of neighbouring values of $\boldsymbol{y}$, referred to as spatial lag (Zhang et al., 2009).

For assessing and determination of spatial autocorrelations, local indicators of spatial autocorrelation exist (cf. Anselin, 1995). The most widely used coefficient is the Moran-coefficient, which is a form of the Pearson-coefficient (Legendre and Legendre, 1998). It defines the linear connection between the individual observations and the weighted mean of the neighboured observations of the same variable (Fortin et al., 2002). For null hypothesis it will be assumed that no spatial autocorrelation between two neighboured observations (here: purchases) of the same variable exists. At statistically significant deviance from the expected value the observations are interdependent and influence each other. The utilisation of the

Moran-coefficient requires an asymptotical, normal distributed sample with n>60 (Griffith, 1996). The observations must have steady means and variances (Cliff and Ord, 1973) and will be termed as spatial stationary process (Schabenberger and Gotway, 2005). Therefore, the Moran-coefficient is not robust against statistical outliers (Fortin et al., 2002), so the data has to be verified for normal distribution with the help of QQ-plots and outliers have to be eliminated. This should be achieved with data snooping according Baarda (1968), but only transactions of the normal business transactions (without, e.g., compulsory purchase) are taken into account.

If the spatial autocorrelation does not exist in the adjacent observation of the same variables, the spatial error model is used. The **Spatial Error Model** (D) assumes that only the error term correlates with $\boldsymbol{Wy}$. The reasons for of this autocorrelation are normally processes and frameworks, which are unknown or not recorded (because they are spatial inherent) (Kissling and Carl, 2008). The spatial error model is a combination of the linear regression model and a spatial autoregressive model in the error term $\boldsymbol{\varepsilon}$. The model is defined as follows:

$$(5)\ \boldsymbol{y} = \boldsymbol{X\beta} + \boldsymbol{\varepsilon} = \boldsymbol{X\beta} + \boldsymbol{\lambda W\varepsilon} + \boldsymbol{\xi}$$

where $\boldsymbol{\lambda}$ is the spatial autocorrelation parameter, $\boldsymbol{W}$ the spatial weighted neighbourhood matrix of independent errors $\boldsymbol{\xi}$. Please note that (like in (4)) the $\boldsymbol{W}$ is a row-sum standardized weighted neighbourhood matrix. The term $\boldsymbol{W\varepsilon}$ is a spatially lagged error term. The value of $\boldsymbol{y}$ for each location is affected by errors of all locations through a spatial multiplier.

In contrast to the models of spatial autocorrelation, which assume spatial stationary processes, the **Geographically Weighted Regression** (E) of Fotheringham et al. (1996 and 2002) permits the calculation of spatial different regression coefficients (Brunsdon et al., 1998) through the extension of the traditional multivariate regression approach with the coordinate (u_i, v_i) of the place *i*. It is assumed that each sample has a georeference.

$$(6)\ \boldsymbol{y} = \boldsymbol{\beta_0}(u_i, v_i) + \sum_{k=1}^{p} \beta_k(u_i, v_i)\boldsymbol{X}_k + \boldsymbol{\varepsilon}$$

Applying the principle of least squares approaches yields to:

$$(7)\ \hat{\beta}_i = (\boldsymbol{X}^T\boldsymbol{W}_i\boldsymbol{X})^{-1} \cdot \boldsymbol{X}^T\boldsymbol{W}_i\boldsymbol{y}$$

W_i is a geographical weight matrix for the reference point *i*. The weight matrix has a functional relationship with the distance vector d_i from the reference point *i* to all neighbours and *h* as decay parameter: $W_i = f(d_i, h)$ (Zhang et al., 2009). h ensures that observations closer to reference point *i* have a greater weight than observations that are geographically far away.

The difference-in-difference-technique (DID) is not suitable, because no reference group exists. For the spatial limitation (which data points will be included and which not) a spatial kernel will be laid on every point *i* and the surrounding data will be weighed regarding the kernel, which shows the weighing as a function of the distance, made by the spatial kernel. The correct selection of the kernel range is crucial, because this can influence the characteristics of the matrix W_i (Brundson et al., 1998). Therefore, different variants will be tested.

The individual weighing results in a weighing matrix of $n \cdot n$ (n = number of observations/purchases), which will be inserted in the calculation of the estimated regression-coefficient-matrix. Thus, weights of neighbourhoods nearby can be considered in the estimation of the parameter vector. The results are local-specific regression parameters, which can be mapped.

3. Discussion

To differentiate between the perspective of spatial autoregressive techniques and spatial stationarity, we assume that

- spatial autoregressive techniques are needed if it is examined on unbiased global average changes for an independent (influencing) variable
- spatial stationarity is needed if it is examined on changes *in a specific neighbourhood*

Table 1: Usability of the models in regard of spillover effects

Models	Characteristics	Expected Importance for Spillover Effects
A) *Linear Regression Model*	*Limited possibilities* to consider spatial information (e.g. distances as independent variable)	Only initial impressions on spatial effects
B) *Linear Mix Model*	*A signal* is estimated from residuals	Spatial conditions can be modelled only from residuals – without naming special variables (low significant effects)
C) *Spatial Lag Model*	Spatial diffusion process and captured substantive *spatial dependence in the data* (spatial autocorrelation exists in the neighboured observation)	Neighboured purchases can be modelled as spatially auto correlated → ideal location with same conditions addresses this issue
D) *Spatial Error Model*	Spatial autocorrelation *does not exist in the neighboured observation* of the same variables, but it can be assumed that only the error term correlates	If spatial autocorrelation cannot be proved, the spatiality can be estimated only by residuals
E) *Geographically Weighted Regression*	Regression coefficients for *each location* (u_i, v_i)	It is possible to have a look on a concrete condition in specific locations

The models have to be scrutinised on their ability to detect spillover effects. The result could be a cartographical visualisation of location-dependent distribution of spillover effects (similar to catchment-point-presentation of accessibilities in routing-algorithms). In urban reconstruction, a value increase arises, which compensates the economic losses (BMVBS, 2007) (value preservation). In strongly decreasing areas, the general economic development is regressed so much that the reconstruction measure can only damp the value loss with the increase initiated by measure.

Quantifying the spillover effects, we face two problems: on the one hand, the statistical power of the sample could be not sufficient due to a lack of recently sold properties in a neighbourhood. The sales comparison approach seems to mostly in line with current market activities, but requires at least 15 purchases per right-hand-variable (Weitkamp and Alkhatib, 2014). Areas with few transactions exist very often and are rare on data. Usually, experts estimate the value by their expertise (Soot et al., 2017). Beneath few data, outliers could not be properly detected in areas with few transaction and if detected, the information, the outliers carry, should not be lost by elimination of information. Different robust and or Bayesian approaches are developed and tested for areas with few transactions (Dorndorf et al., 2017, 2016).

On the other hand, it is challenging to dedicate distinctively value changes depended on economic trends or on urban measures, because there are no ground-truth-data representing the evolution of the neighbourhood without urban measures. The trend extrapolation is not robust, since there are no "truth" values.

In real estate valuation, only a small part of the spread can be explained by the functional relationship (in German real estate valuation practice, the coefficient of determination lies often only between 0,4 to 0,7). With spatial modelling, only a part of this spread will be explained. Beneath, the remaining spread results from

- smaller influence, which cannot be modelled
- variables, which are highly correlated with other ones, so they are excluded and
- influences, about which no information exist (e.g. purchaser-seller behaviour)

Beneath spatial effects many other effects exist, which have only small influence on value. In normal regression analysis, these influences will not get significant on dependent variable and cannot be modelled.

4. Conclusion

In Germany, planning law balancing burdens and benefits is only regulated for urban remediation measure. With verification of spillover effects, a consensual negotiation in other measures would be easier. The spatial assignment of the spillover effects is an essential prerequisition to finance the dismantling. A transfer to villages lacking data and probably showing fewer subventions is considered.

In villages, it is to be expected that the knowledge will play an outstanding role; it would help to design methodological instruments to balance between various private owners and helps to finance needed dismantling. The method could also be used to quantify negative externalities of land development in shrinking regions. Many municipalities decide for the development of rural to urban land to attract new inhabitants (Schaffert and Köhler, 2015; Berndgen et al., 2018). However, the new housing is occupied by people already living in the village (Köhler, 2014), that causes vacancy and thus a decrease of property value in the core ('donut-effect'). Those externalities are not calculated yet, e.g., in a fiscal impact analysis. Quantifying the negative impact and the subsequently needed public investment to restructure the building stock, would probably improve an urban redevelopment instead of development.

Resuming, an algorithm is needed in future analysis, which can handle on the one hand few data, heterogeneous data and outliers, and on the other hand processes highly correlated variables and variables with only a small influence. Besides, the algorithm must be able to spatially model the circumstances. The regression analysis should be further developed to a structural equation modelling. Added value would be to combine correlated variables within a latent variable. These structural equation modelling have to expand to a spatial component, like describe above. With this method, a quantification of spatial impact effects would be possible.

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Arthur Schindelegger*

Relocation for Flood Retention in Austria

Abstract

Flood risk management in Europe has considerably changed over the past decades. Structural defence systems are no longer prioritised but integral solutions combining different measures are favoured instead (EC, 2007). Relocation of households located in hazard prone zones is one possible measure to substantially reduce hazard risk. Besides the global discussion on resettlement and relocation in context with climate change (López-Carr and Marter-Kenyon, 2015, Sherbinin et al., 2011) and disaster risk reduction (Claudianos, 2014; Correa et al., 2011; Hino et al., 2017) several relocation projects within state-lead hazard protection projects were carried out lately in Austria. Already in the 1970s, people living in certain flood plains along the Danube River were relocated and this measure regains importance. The paper aims to clarify the regulatory framework enabling the execution of relocation projects and to portray the role of spatial planning in securing flood retention and run-off areas based on case studies. Findings clearly document the organisation of the process and the coordination of stakeholders as crucial elements for effective relocation. In addition, compensation payments and a sufficient legal framework matter as well, while the idea of establishing retention areas has not been prioritised by decision makers yet.

1. Introduction

Austria is a comparatively small federal republic in the centre of Europa with its topography dominated by the Alps. Exposure to natural hazards, such as floods, rock fall, debris flows, avalanches and landslides is generally high in valleys and the physical space for flood retention is very limited due to the development of settlements. There is no significant trend in the frequency and intensity of flood hazards due to climate change effects, while the degradation of permafrost in steep slopes and rock walls is expected to change hazard frequencies for alpine mass movements (Climatechangepost, 2017). Nevertheless, land sealing, soil compaction and structural defence measures are changing run-off behaviour and flood curves considerably. Big flood events caused by River Danube as well as by feeding rivers with severe damages in 1991, 2002 and 2013 put pressure on stakeholders to search for integral solutions in flood prevention. Anyhow, flood risks differ largely concerning the concrete situation and the Austrian flood risk management has to deal with torrential floods that develop within minutes as well as river floods that allow preparation. Two major research programmes supervised by state ministries were carried out (BMLFUW, 2004; BMLFUW, 2009): The first one with the aim to evaluate the existing flood risk management and the second to elaborate activities for improvements. Within the second research project Seher et al. (2009) carried out a study on relocations implemented along the River Danube in the

* TU Wien, Department of Spatial Planning, Land Policy and Land Management/Austria.

flood aftermath and identified recommendations for process design and framework conditions in Austria. Additionally, the European Flood Directive (EC, 2007) promotes the establishment of a holistic perspective in flood hazard management and therein, the consideration of relocation as an adaptation strategy came into public awareness and found its way into the Austrian Flood Risk Management Plan (BMLFUW, 2015). In fact, the relocation of households situated in hazard prone areas cannot be a general solution to mitigate flood hazards but represents one feasible measure in the large set of tools in areal prevention, structural, non-structural and organisational measures. The essential basis for relocation in a constitutional state is the principle of legality, as such severe interventions in private property and in individual livelihoods need appropriate titles and have to respect the principles of equality and proportionality. Besides the legal aspects, the organisation and coordination of such long lasting processes with multi-stakeholder participation, extensive costs and generally low public and political acceptance are substantial challenges.

The paper is based on a comprehensive PhD research focusing on legal aspects of relocation in Austria and on actual implementation processes from a planning perspective. There do not exist any profound studies on planned relocation in Austria so far. The research uses therefore a mixed methodology based on an iterative principle and incorporates the grounded theory method (Glaser and Strauss, 1967 and 2010) to process different sets of information based on a normative and positivistic understanding. Compiled information is categorised and classified to identify process elements for comparing different case studies. Stakeholder roles and process designs are identified by means of qualitative interviews with representatives of state authorities and public administration. The respondents were chosen due to their professional engagement in planned relocation projects or their political function in deciding on the scope of relocation and framework.

2. International discussion on resettlement and relocation

Currently the international scientific community experiences an increasing attention to the discussion on resettlement in the context with climate change and relocation in connection with natural hazard risk. The terms relocation and resettlement are not clearly defined. Some see the terms as synonymous, while others tend to call state led interventions as relocation and understand resettlement as an uncontrolled effect of disasters connected to displacement (Black et al., 2012). Between 2008 and 2013, an average of 27 million people have been displaced by disasters per year, leaving the poorest to be also the most vulnerable (Yonetani, 2014). The planned relocation discussion is strongly connected to the impacts of observed and expected climate change. Coastal communities all over the world face rising sea levels and suffer from their exposure to storms (Abel et al., 2011; Binder et al., 2015; Bronen and Chapin, 2013). Changes in precipitation and temperatures lead to land degradation, desertification or on the contrary to extreme flood events. Worldwide, people are displaced by these events and lose their livelihoods. State led planned relocation can help to diminish hazard risk and to a certain extent can severe as climate adaptation strategy in prevention. Scientists all over the world assess and document at the moment such relocation processes in case studies (Petz, 2015).

The United Nations sub organisation UNHCR[1] has undertaken serious efforts in research and practical guidance on resettlement and planned relocation. A first resettlement handbook was published in 1996 and revised in 2011 (UNHCR, 2011) focusing on refugees. More recently, a disaster respectively climate change centred view was published in 2015 with the "Guidance on Planned Relocation" (UNHCR, 2015). Therein the term of planned relocation is defined as "a planned process in which persons or groups of persons move or are assisted to move away from their home …, are settled in a new location, and provided with the conditions for rebuilding their lives." (UNHCR, 2015) Relocation is understood as a process addressing institutional, legal and policy frameworks at the same time. A 'toolbox' report for planned relocation followed in 2017 (Ferris, 2017) with the aim to protect people from disasters and environmental change.

An important international strategy for promoting planned relocation is the Sendai Framework for Disaster Risk Reduction. The framework is an outcome of the 3rd UN World Conference in 2015 aiming to achieve a sustainable reduction of disaster risk. Within the four priorities of the framework, relocation several times is mentioned as a possible measure in high-risk areas or concerning sensitive land-uses. (UN, 2015) The framework promotes relocation as an appropriate measure in risk reduction and adaptation.

3. Relocation in Austria

In Austria, relocation projects in flood prone hazard areas have a certain tradition. In the 'Machland', which is a natural basin of River Danube river in the border area of Lower and Upper Austria, farmers were hit by floods almost every year. Modern agriculture did no longer require farm houses located in close distance to arable land. Thus, municipal as well as provincial politicians realised that a structural flood protection for the scattered farmhouses would not be arguable. Concerned people got a compensation offer and had to sign a relocation contract stating, that compensation payments depend on actually leaving their property. Houses were left but many have not been demolished for a long time and remained there as ruins. This relocation project was special because of two aspects. Firstly, the farmhouses were affected by floods on a very regular basis and secondly the relocation project itself was not part of a flood protection project then. Instead, the department for agricultural affairs of the provincial government took over the coordination of compensation payments because only farmers had been affected. Although these experiences did exist, neither an evaluation nor any research was carried out. Subsequently, the idea of relocation was readopted after the 1991 flood event.

Nevertheless, there still does not exist a comprehensive planning instrument with clear procedures for planned relocation. In fact, such measures address different legal sectors, institutions and hold components regulated in public as well as civil law. This leads to a situation, where traditional structural flood prevention is clearly regulated and entitled with

[1] United Nations High Commissioner for Refugees, located in Geneva/Switzerland.

expropriation rights, whereas relocation can only take place on a voluntary basis. That makes such processes interesting for researchers, but also faces institutional and political resistance due to complex processes with vague outcomes and efficiency. In Austria, there has been no need to discuss planned relocation in connection with climate change effects yet. However, there is an urge to discuss planned relocation for buildings located in high-risk areas, where structural flood defence is economically not feasible or where areas are needed for retention purposes. Relocation is therefore especially an option for floodplains with small scattered settlements and solitary buildings.

Generally, the flood risk management is a state duty. People living in flood prone areas have the right to receive safety measures (Davy, 1993). The overall competence lies on federal level and is regulated by the Water Rights Act (WRG, 1959). Concerned people do not have the right to choose their preferred protection measure but on their property, they can undertake individual self-financed measures. This also means that flood affected parties have no right to claim for relocation. The decision which measure is carried out has to be based on objective assessments and analysis. The decision is up to politicians on local, provincial as well as federal level by assigning resources and financing to projects.

As described above, planned relocations are rare in Austria but they have gained importance over the past decade. This is mainly caused by to the integral approach of the Flood Directive (EC, 2007), by simple economic reasons as well as by individual commitments of authorities in ministries and in provincial administration. The biggest relocation projects were carried out along the River Danube with in total more than 500 affected households. Other planned relocations took place on the River Ill in the municipality of Göfis or for constructing a retention basin at the River Enns in Flachau. In the province of Tyrol, currently the relocation of a few buildings in connection with the construction of three large retention basins along the River Inn is a matter of debate. Usually relocation is negotiated individually with owners who can decide to accept or decline the compensation offer on a voluntary basis. Guidelines and financing schemes considerably differ from case to case.

4. Case study – Eferding basin

The Eferding Basin is a 60 km^2 large natural basin along the River Danube located in Upper Austria. The site is just a few kilometres upstream of the provincial capital city Linz with more than 200'000 inhabitants. The basin holds rural municipalities with small villages as well as scattered farms and was widely flooded in June 2013. The level of the "hundred year flood" of 2002 was exceeded by up to 119 cm (BMVIT, 2015). Besides agricultural land, many houses in the basin suffered damages. So far, the Eferding Basin had no coordinated flood protection measures in place and was hit with little possibilities for flood mitigation.

Local politicians were calling for a solution to the unbearable flood risk and the province of Upper Austria agreed in accordance with the federal state to invest up to 250 Mio Euro in flood defence in the area until the year 2022. The development of an integral protection concept consisting out of two modules was initiated. The first module dedicated a zone for

voluntary relocation. The second module provided a structural defence for the remaining low risk areas as well as an extension of the relocation area. The political decision on the relocation zone was taken in autumn 2013 – only a few months after the flood event. The design of the structural measures took about three years and is still waiting for realisation (Schindelegger and Weingraber, 2018).

4.1. Regulatory framework for the relocation process

Shortly after the political decision about the extent of the relocation zone the preparatory work started. The Department for Surface Water Management of the provincial administration of Upper Austria took over the coordinative role. The process was designed similar to the relocation in the Machland basin in Upper Austria a decade before. People living in the relocation zone were offered to have an expert opinion on the value of their real estate (value before flood damages occurred). Based on this expertise a compensation consisting out of 80% of the buildings value and 80% for the costs of demolishing the buildings is granted. The concerned people are free to accept or reject this offer. If they accept, they have to sign a contract containing their liabilities and the renunciation to rebuild anything. Demolishing the houses is organised by themselves. The individual perspective sounds simple, but the established scheme brings up difficult aspects too. The 80% rate of individual applications to be granted is regulated in a legal act defining cost contributions for flood protection along the River Danube (WBFG, 1985). Normally half of the money comes from the federal state, 30% from the province and the remaining 20% share is the individual contribution. This is why a coordinative board is necessary to negotiate the prerequisites for the compensation as well as the measures to keep the relocation zone undeveloped in the future. For the Eferding Basin an informal coordinative board with political members from all parties represented in the provincial government, with technical staff from the responsible ministry and from the provincial administration as well as representatives from municipalities, was established and met on a regular basis. Members of the board were announced by the provincial government based on experiences made in former relocation projects. The Austrian Ministries for Infrastructure (bmvit) and for Finance (BMF) controlled the expert opinions on the value of concerned buildings. The provincial administration supervised the process and the communication with the public and the media. The affected municipalities did not have any cost contribution and therefore no decisive role in the coordinating board but they were in charge of land-use planning and executing building regulations. This empowers municipalities to be crucial stakeholders for securing flood retention and run-off areas in the long-term. The municipal councils have to decide on building bans and on the zoning out of building land to prohibit further development. Figure 1 presents a generalised diagram on the relocation process in the Eferding Basin (Schindelegger and Weingraber, 2018).

4.2. Evaluation of the process

A review from a planning perspective on the relocation process reveals that so far the planned relocation has not been a success story. The institutional set-up was designed to combine

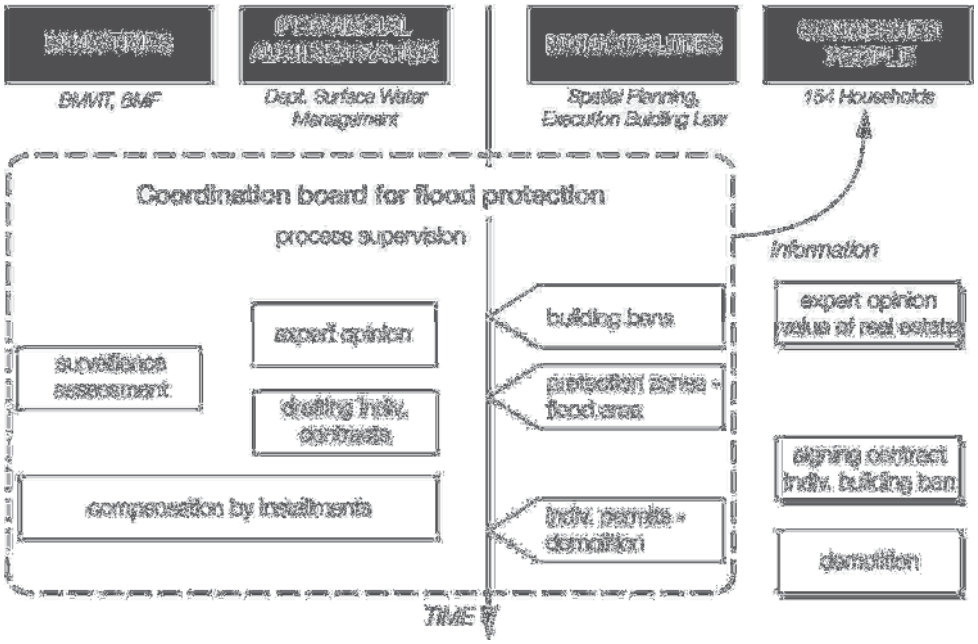

Figure 1: Stakeholders and their responsibilities in the relocation process.

public law and civil rights contracts based on political agreement and to rely on the willingness of people living in the relocation zone to leave and accept compensation. Several aspects did undermine the public intentions.

Shortly after the flood event in summer 2013, concerned people founded a citizens' initiative in the Eferding Basin. Several public institutions were blamed to have intentionally flooded the basin. The decision on the relocation zone just a few months after the flood event, without any analysis of the event, corrupted the credibility of provincial politicians and the public administration. This led to a climate of mistrust impeding talks with municipalities and concerned people. The mayors and local politicians were exposed to strongly opposing positions on planned relocation, making the discussion more a matter of believes than facts.

Until January 2016, around 55% of the resettlers identified in the first module accepted the offer to leave and to demolish their houses (AdOÖLReg, 2016). This leads to the paradox situation of people who are likely to live on in the relocation zone without having any right for alternative protection measures or public financial aid to adapt their homes. At the same time, the costs for operating the public infrastructure such as roads, water supply lines or the sewage system are approximately the same for the municipalities with less people paying for it. Additionally, the relocation zone cannot be fully utilised for flood retention and run-off purposes. The actual effectiveness of this relocation is therefore rather low.

Anyway, flood retention was no key argument in the discussion on combining different protection measures (dams, spatial planning etc.) in the basin. The main point for performing a planned relocation was simply the situation of having no other feasible prevention

measures for high-risk areas in the basin. Flood retention was in this sense more an accessory argument.

Spatial planning plays a crucial role in keeping the relocation zone undeveloped. Municipal councils take decisions on land-use planning as well as on concepts of local development. A regional coordination would be necessary to enable a regulation on the regional phenomenon of floods on the according level. Now, all concerned municipal authorities take individual zoning decisions partly undermining the aim of establishing a regional retention and run-off area.

In 2016, the plan for the second module of the project was presented and the relocation zone was enlarged. This led to the unjust situation for concerned people of waiting years for a decision and finally not getting structural protection measures. This currently leads to polarising discussions on the local level and impairs the public trust in relocation as a state led measure.

5. Conclusions

Planned relocation is a complex process with many aspects and perspectives to consider. A sufficient legal framework with appropriate planning instruments is needed for carrying out such measures. As there is no legal title in Austria, planned relocation takes place on a voluntary basis. Usually planned relocations are carried out in combination with other prevention measures in holistic protection projects. Theoretically this ensures that low risk areas receive structural defence to allow further development, while relocation areas can be used for floodwater storage and run-off. The discussion in Austria and various case studies show, that there are certain crucial aspects that determine the success of planned relocations. The listed aspects were identified by confronting interview partners with already published recommendations (Seher et al., 2009, Ferris, 2017) and hypothesis of the author against the background of their individual experiences.

- There is a *window of opportunity* after flood events that help to carry out relocation because of a large willingness of concerned people to leave. At the same time a quick decision for relocation without evaluating other measures can lead to mistrust and accusations.
- A major key to success of planned relocation is the actual *process of coordinating different stakeholders* and the communicating with concerned people and local politicians. Fake-news on the media can strongly befoul the discussion climate.
- People cannot be forced to relocate. At the same time, the decision-making is *not entirely voluntary.* Financial aid is only granted within a certain predefined period and normally no alternative protection measures are financed. This puts pressures on concerned people.
- In the sense of the UNHCR guidance on planned relocation the Austrian examples *lack professional accompany* of concerned people for informing them on their options and on

their rights as well as for helping them to search new accommodations and to integrate them in new surroundings.

In conclusion, planned relocation plays a minor role in modern flood risk management in Austria but remains to be challenging in successful implementation. General guidelines are missing. Flood retention itself only plays a minor role in the context of planned relocations. Referring especially to the ideas of the Flood Directive and SFDRR (UN, 2015) further efforts are needed to apply planned relocation in a transparent, fair and effective way, taking livelihoods and benefits for retention and floodwater run-off into account.

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Reto D. Jenny*

Conservation and Use of Historic Industrial Cultural Heritage Sites

Examples of industrial buildings of a textile company in Ennenda / Switzerland

From a planning perspective, as well as from cultural and historical points of view, there is interest in dealing with the question of former industrial sites and buildings. The handling of such culturally relevant properties raises questions regarding the interests of the owners, the public, residents, potential users and investors, as well as the preservation of monuments. The key is optimization of interests to meet various community needs like creating housings, jobs, storages, public services etc. while respecting the cultural significance of former industrial buildings and facilities.

1. Introduction

From the beginning of the 19th century, the Canton of Glarus rapidly developed into one of the most industrialised regions in Switzerland, especially in the textile processing industry. It included all sectors of cotton processing, spinning, weaving and printing, for which Glarus was well-known on the world market at the time (Jenny-Trümpy, 1898/1902; Kaufmann, 2014).

Early industrial development began with river and water level correction and draining of the rough and marshy Linth valley (1807–1822), which was one of the largest land-improvement projects in the Swiss Alpine area of the time (Winteler, 1954). This enabled better navigability, newly developed roads for transport, and channels for lasting use of water power. Later (1859) Glarus was accessed by rail, and finally the high potential for workers from the large families of the time contributed to this expansion (Bodmer, 1952). Swiss industry also benefited from political circumstances between the Napoleonic Wars and the Second World War due to internal and inter-state conflicts in neighbouring countries. The textile industry of Glarus continued to hold this position, as opposed to foreign competition, until the so-called "Oil Crisis" of 1973. Since then, dozens of companies and thousands of employees have been drastically reduced to three textile companies totalling a few hundred employees in the canton (Arx et al., 2005).

The Glarus textile industry reached its peak between the middle and the end of the 1860s. The economic statistics of Glarus in winter 1868/9 show 18 spinning and 17 weaving companies with more than 3,700 employees and 23 printing companies with about 5,500

* Comptoir Daniel Jenny & Cie. Ennenda/Switzerland.

employees (Jenny-Trümpy, 1902). More than half of the workforce was employed by the textile industry of the canton.

One example is the former industrial site of the Company of Bartholome/Daniel Jenny & Cie. in Ennenda/Glarus, which was established and in operation between 1830 and 1975. A brief outline describes its history, emergence and development in the field of textile printing using the mostly still-existing buildings from its founding until the present (Jenny, 2008). Questions about present and future use for industry and trade or residential buildings, shops, cultural institutions and museums etc. will be discussed on the basis of the presentation of the individual buildings, as well as the whole complex. The aim and goal of this discussion is to initiate the most authentic preservation of industrial heritage through adapted and sustainable use.

2. The company of Bartholome Jenny & Cie.

The company, founded in 1808 by Bartholome Jenny (1770–1836) and his two younger brothers Caspar and Fridolin, started with trading and weaving of cotton and cloths. The company bought the yarn that so-called "ferggers" (middlemen between traders and home-workers) distributed to homeworkers in the area. The hand-woven fabrics were subsequently collected from the homeworkers, and the cloth was then printed and sold on markets (Jenny-Wipf, 2005).

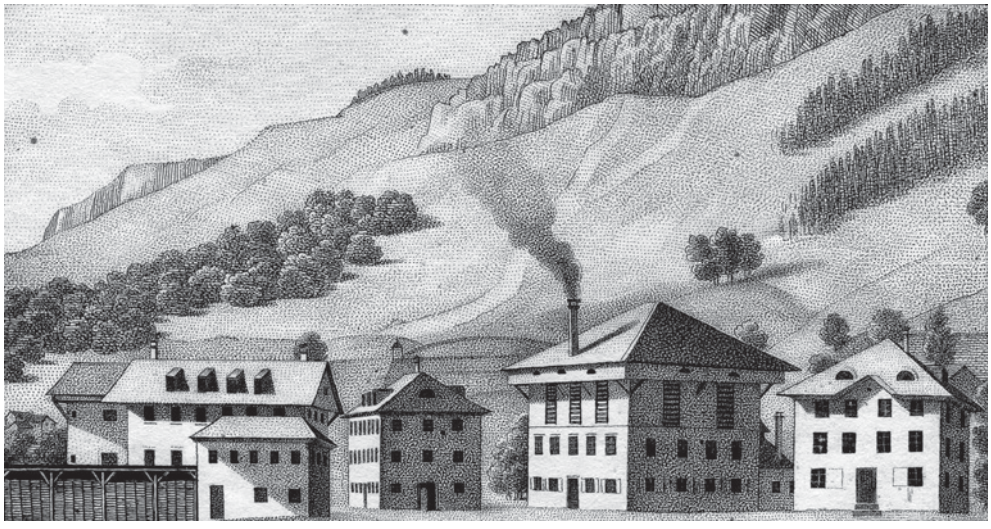


Figure 1: The early stage of Barth. Jenny & Cie. site in Ennenda ca. 1835 with its individual buildings from the perspective of the viewer: A – First Housing & Factory (left behind), B – Colour Laboratory (left in front), F – Road Printing Factory (middle), C – "Old" Hanging Tower (middle to right), D – Patron's Residential House (right), E – Heated Hanging Tower (small building between C and D). Letterhead (CA, No. 1).

When a new textile printing enterprise were established by Jacob Trümpy (1808–1889) and his elder brother Balthasar in Ennenda in 1827, Bartholome Jenny got in touch with "Gebrüder Trümpy" [Trümpy Brothers], leading to the fusion of the two firms in 1830 (figure 1).

This successful business connection was also privately strengthened by the marriage of Jacob Trümpy to Bartholome's eldest daughter Anna. The company took the name of "Bartholome Jenny & Cie." and as a result of his exceptional skills a rapid expansion of the establishments led to one of the largest textile printing factories of the Canton Glarus. During this enormous industrial development Jacob Trümpy set up two other factories in the south of the canton – a spinning and weaving mill in Haslen in 1846, as well as another textile printing factory in Mitlödi in 1856 – which are both still in operation today, partly in the same original buildings (Arx et al., 2005; Jenny, 2017).

According to the afore-mentioned economic statistics of Glarus, in 1869 Barth. Jenny & Cie. employed about 450 workers in Ennenda. Together with the spinning and weaving mill in Haslen it became the largest company of the Canton Glarus with a total of about 920 workers (Jenny-Trümpy, 1902). In contrast to most other textile enterprises, all operations from raw cotton to printed fabrics have been in the same hands since 1846. The structural development of the company can be seen by means of the illustrated letterheads of 1845 (figure 2) and 1860 (figure 3).

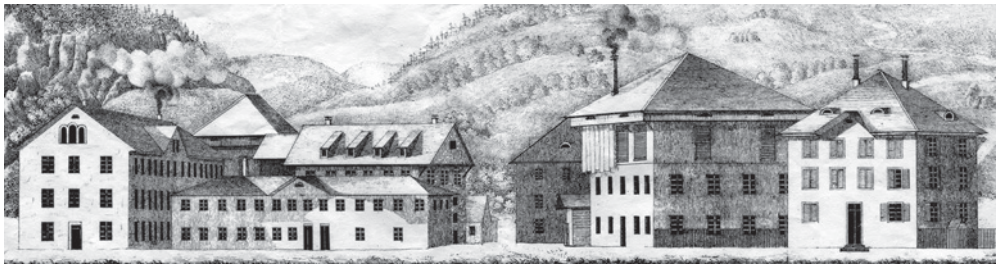


Figure 2: Development of Barth. Jenny & Cie. site in 1845 added with G – former 1st Large Printing building until 1855 (left in front), another Hanging Tower in behind demolished in 1907, B – Design & Engraving House enlarged of the former Colour Laboratory. Letterhead (CA, No. 2).

This structure of the company was very successful until the turn of the 20th century. In 1907 the textile print section in Ennenda closed down due to changed economic circumstances. After the closure, an operating branch of the spinning and weaving mill in Haslen was built in the northern part of the former Ennenda printing plant, which was finally abandoned in 1975. Since then, accompanied by necessary structural changes, only the former factory plant in Haslen still exists as a specialized weaving company under the name of "Daniel Jenny & Co.", renamed in 1902 (Jenny-Wipf, 2005; Jenny, 2008).

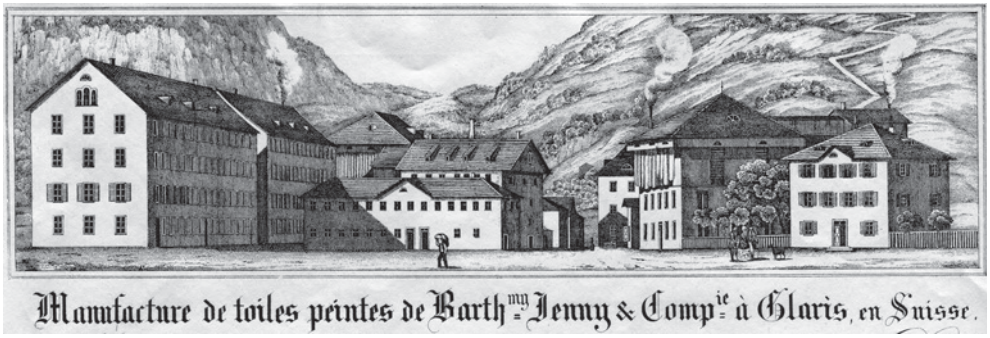
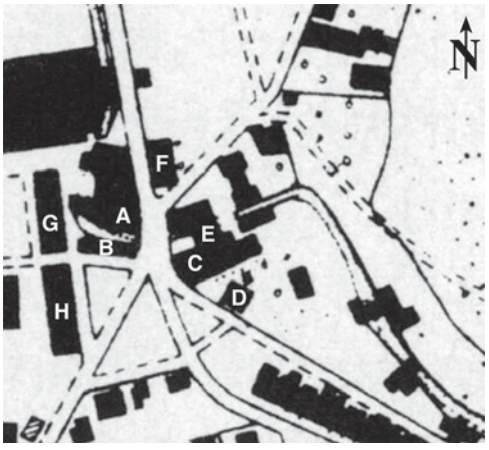


Figure 3: Final stage of Barth. Jenny & Cie. site ca. 1860 added with G – 1st Large Printing Building (rebuilt) from 1856 until 1992, and H – 2nd Large Printing Building (as a twin-building left in front). Letterhead (CA, No. 3).

The focus here is on the appearance of the ensemble and its individual buildings of the aforementioned textile printing factory of Barth. Jenny & Cie. in Ennenda today (figures 6–9). The situation map below shows the area of the former industrial site with its individual and very characteristic buildings (figure 4). First, however, one must take note of certain spatial planning conditions.



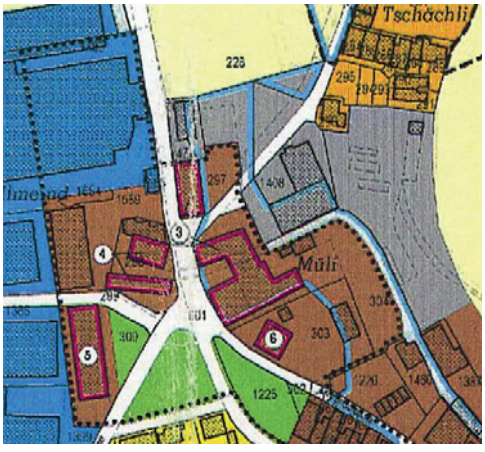


Figure 4: (left) Situation map of the former industrial site with its individual historic buildings of Barth. Jenny & Cie. marked by letters.

Figure 5: (right) Clipping of the Municipal Land Use Plan of Ennenda/Glarus from 2011, focussing the same area (BauR, 2011: ZP).

3. Spatial planning framework

The aim of municipal spatial planning is to ensure a controlled development of living, working, and recreational space within the entire municipality. Therefore, typical village structures, their natural landscape, heritage sites, and settlements must be taken into consideration (BauR, 2011: Art. 1).

The scope of the Municipal Land-Use Plan (Zonenplan) (figure 5) and its associated Building Regulations (Baureglement, BauR), dated on the 1st of July, 2011, apply to the whole (former) territory of Ennenda which has been part of the Greater Municipality of Glarus since 2011.

Based on the Swiss Nature and Cultural Heritage Protection Act (Natur- und Heimatschutzgesetz, NHG) and cantonal regulations the municipal council designated a number of cultural-historical relevant buildings as protected objects. All the most valuable objects are assigned a number in the Municipal Land-Use Plan; they are preserved and may not be removed (BauR, 2011: Art. 26).

The major part of the identified area (of the former company) is located in the so-called village and core zone in which adapted use and renewal of residential and commercial buildings are coupled with legal requirements taking into consideration its characteristics and original structures (BauR, 2011: Art. 10).

The northern part of the identified area is defined as an industrial and commercial zone (BauR, 2011: Art. 14). There are still old spinning and weaving buildings from the early 20th century, which were converted into metalworking halls after 1975.

In the middle of the identified area is a green zone that keeps free the surroundings and view of the typical old industrial buildings of the former company. Existing old trees and the grassland must be preserved as an open space with respect to the visual quality of the historical building ensemble (BauR, 2011: Art. 16).

The Municipal Land-Use Plan shows the outline of the protected cultural heritage zone (BauR, 2011: Art. 20). This perimeter is based on the Federal Inventory of Swiss Heritage Sites (Inventar der schützenswerten Ortsbilder der Schweiz, ISOS). The character of these remarkable historical buildings and their surroundings – the traditional settlement structure and streetscape – are strictly preserved (ISOS, 1992/93). In this case construction projects are limited and require the audit of the Department of Monument Conservation (Denkmalpflege).

In the north-eastern part of the identified area, outside of the dotted protected cultural heritage zone, the Municipality of Ennenda established a zone for public buildings and facilities (BauR, 2011: Art. 15), where, unfortunately, the company's old horse stables and coach house were replaced with a new multipurpose building including garage space, storage and the fire service.

4. Buildings of the former textile print company

Based on the situation map (figure 4) and table 1, the individual buildings of Barth. Jenny & Cie. can be identified with regard to their location and their functions. The objects are marked with letters (A–H).

A – The *First Building* of "Gebrüder Trümpy" [Trümpy Brothers] was built for multipurpose functions in 1828. The workrooms were on the ground- and the first-floors and

two apartments were on the upper floors. The roof was ventilated and used to dry the printed fabrics. There were racks at the ends of the building to dry the cloths. With the extension of the factory in the 1840's, this building was converted into company apartments (CA, Nr. 4; Kupper, 1984). The building still belongs to the company, and the apartments were renovated and rented.

Table 1: Overview of the individual industrial buildings

Object (Figures)	**Built** (Renewed)	**Original Use** (Other Use until 1975)	**Current Use** (Reuse Options)
A (1–3, 6)	1828 (last 2002)	First Housing & Factory (Workers Apartments)	Rental Apartments
B (1–3, 6)	1832 1840	Colour Laboratory Design & Engraving House (Workers Apartments)	Storage (Public Information)
C (1–3, 7)	1832/3 (2006)	"Old" Hanging Tower (Industrial Use)	Residential House & Business premises
D (1–3, 7)	1834	Patron's Residence	Residential House
E (1, 3, 8)	1834	Heated Hanging Tower (Storage)	Storage shed (Exhibition & Demonstration)
F (1–3, 8)	1836/7 (last 2003)	Road Printing Factory (Industrial Use)	Rental Apartments
G (2, 3, 6)	1838 | 1855 (1992/3)	1st Large Printing Building resp. "New" Hanging Tower	Business Premises Anna Göldi Museum
H (3, 9)	1855/6	2nd Large Printing Building & Comptoir (Office)	Museum & Archive Factory Shop

B – The former *Design & Engraving House* in its classical symmetric appearance was originally a grain mill and only half the size. From 1827, this little building was rented by Gebrüder Trümpy and used as a *Colour Laboratory* for printing. This property was purchased in 1832, after merger of the companies by Barth. Jenny & Cie. In 1840, it was enlarged to its current appearance for its main functions of pattern design and engraving models (CA, Nr. 4; Kupper, 1984). This building is still owned by the company and is currently used for the "Baumwollblüte" (Cotton Flower) factory shop.

Note: One suggested option would be to integrate a public information corner for the nearby museums. The building substance and appearance must be preserved. The front garden could be replaced with cobblestone paving to express its industrial character.

C – The former *"Old" Hanging Tower*, built in 1832/3, replaced the hanging of wet cloth at residential and printing houses (A) for the first time. The high drying room was ventilated by tall, narrow slits and because of the special roof construction the cloths could also be hung outside. Wooden hanging towers are very typical features of the traditional printing companies in the Canton of Glarus (G).

Figure 6: Site (west) of Barth. Jenny & Cie. today: G – "New" Hanging Tower (rebuilt in 1992/3) (left), A – First Housing & Factory (right), B – Design & Engraving House (in front); photo: author, 2016.

The rooms on the ground- and the first-floor were used for cloth storage and the first office of the company (CA, Nr. 4; Kupper, 1984). This building was sensitively renovated in 2006 and is now used as a residential home in the private estate of the descendants.

D – The *Patron's Residential House*, built in 1834, was part of the former industrial plant. It is a dice-shaped building in typical classical form. The interior of the beletage is preserved in the original Biedermeier style (CA, Nr. 4; Kupper, 1984). This house was always inhabited by company leaders until 2007; since then it has been owned by hereditary descendants of the company. This building is protected.

E – The *Heated Hanging Tower*, built in 1834, was necessary because of brilliant steam colour printing. The differences from the wooden hanging tower include the brick-built heated core and fewer windows for generating hot air (Jenny, 2017).

Note: This building is owned by the company and is used as a storage shed. The restoration of this building is important with regard to the entire ensemble and could be used for a variety of creative activities. One option could be to set up a small multipurpose exhibition room with demonstration facilities to show the process of a former textile print shop.

Figure 7: Site (east) of Barth. Jenny & Cie. today: C – The "Old" Hanging Tower, renovated in 2000 (left), D – Patron's Residential House (right); photo: author, 2016.

F – The *Road Printing Factory*, built in 1836/7, is unlike the first building (A) in that there were no racks or other hanging devices. The cloths were brought directly to the hanging towers (C, E). On the ground floor were the colour vats, and on the two upper floors were the printing rooms (CA, No. 4; Kupper, 1984). After the end of textile printing this building was converted into rented apartments for company workers working in the new spinning and weaving mill across the road between 1907 and 1975. The building still belongs to the company, and the apartments were renovated and rented.

G – The *1st Large Printing Building* – now the *"New" Hanging Tower* – was built in 1840. The exterior appearance has been changed twice. Originally the central gable formed the distinctive characteristic in line with the surrounding classical houses, especially the engraving and design house (B) and the patron's residential house (D) (CA, Nr. 4).

The first major change occurred with the extension to four floors together with the addition of the twin-building in 1855/6 (H) (Kupper, 1984). This building was used by the company until 1975, first for printing and later for spinning and weaving. This building was sold and demolished in 1992/3 and replaced with the re-construction of a former hanging tower from 1865 belonging to another company – Conrad Jenny & Cie. in Ennenda (Arx et al., 2005).

Figure 8: Individuals of Barth. Jenny & Cie. today: E – Heated Hanging Tower (picture left), F – Road Printing Factory (picture right); photos: author, 2016.

The idea was to use the well-preserved roof construction in this area to enhance the appearance of the historical industrial site. Since then, the site has had a variety of uses. On the 20th of August, 2017, the foundation opened the Anna Göldi Museum of her story and human rights in the top floor of the wooden hanging tower.

Note: Anna Göldi (1734–1782) was one of the last women accused of and executed for witchcraft in Europe. It caused great indignation throughout Europe (Winteler, 1954). Only ten years ago, in 2008, she was absolved by the councillor of Glarus and considered a victim of injustice.

H – The *2nd Large Printing Building*, built in 1855/6, was the final expansion of the former printing factory in Ennenda and is still owned by the company (Kupper, 1984). Very similar to the afore-mentioned building, large printing rooms were located on several floors. After the end of the printing industry, rooms on the upper floors were mainly used for varied storage purposes.

On the first floor was the company's main office (until 1975), called the "Comptoir", which is now a museum and archive of the historical period of Barth./Daniel Jenny & Cie. (Jenny-Wipf, 2005) The office is preserved as authentically as possible and represents the atmosphere and the essence of the company until today. On the ground floor is the "Baumwollblüte" (Cotton Flower) factory shop and a coffee bar.

Note: The purpose of the Comptoir is to open up and maintain the unique industrial heritage site. The author and his cousin have supervised this site for the past ten years.

Figure 9: Last main building of Barth. Jenny & Cie. today: H – 2nd Large Printing Building with the "Comptoir" (office) on the first floor and the "Baumwollblüte" (factory shop) on the ground floor (at the right hand side of picture left). The interior of the "Comptoir" office museum (picture right); photos: author, 2016.

5. Conclusions

The representation of this former industrial plant with its associated buildings generates some insights into the preservation and maintenance of industrial heritage sites:

1. Despite losses and changes during the last hundred years, many things have been preserved. In particular, the external appearance as an entire ensemble has been authentically preserved.

2. Detailed municipal building legislation is required that takes into account the superior national and cantonal inventories of site and monument protection, creates spatial planning requirements for continuation of the existing and planned uses, and preserves the historic buildings.

3. Adapted and careful use of old buildings is necessary for long-term preservation. It is not only important for commercial use, warehousing and housing, but also for cultural and ideological uses – for example museums and demonstration facilities which contribute to the preservation of industrial cultural heritage.

4. It is critical that sustainable conservation efforts include not only the observance of external appearance, but also careful consideration of the types of use designated to preserve the valuable, authentic inner substance of these spaces.

5. The growing textile, clothing and fashion industries could present product promotion fairs and educational workshops where the concerns of the textile industry could be discussed. Fashion shows and events could be arranged in the complex, generating additional publicity and advertising opportunities for the complex and the companies involved.

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CA, Comptoir Archive, documents, in particular

- No. 1: Letterhead: "Kassen-Schein" of Barth. Jenny & Cie., ca. 1835.
- No. 2: Letterhead: "Kattun-Fabrik von Barth.me Jenny & C.ie in Glarus", 1845.
- No. 3: Letterhead: "Manufacture de toiles peintes de Barth.my Jenny & Comp.ie à Glaris en Suisse", ca. 1860.
- No. 4: Handwritten description of a painting of the printing factory of Barth. Jenny & Cie. in Ennenda (contemporary image or template of letterhead No. 2), identicated by Ad. Jenny-Trümpy.

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Rūta Dičiūnaitė-Rauktienė*, Jolanta Valčiukienė*, Velta Parsova**, Vida Maliene*,***

The Importance of Environmental Criteria for Kaunas City Pedestrian Zones

Abstract

Pedestrian streets are public areas, where vehicle traffic is completely or partially restricted. In these parts of the city, people can take a walk, shop and ride bikes. Many scientific publications can be found on the social and economic significance of public areas; however, while seeking for the economic city growth and social advancement it is important not to waste natural resources and not to endanger ecological balance. It is noticed that environmental criteria are mentioned only as components of coherence and which have to interact with each other. Still, the pedestrian zones, as public areas intended for people, have to be safe (in the case of motor and non-motor vehicles) and protected from the vehicle emissions and noise. In addition, trees and green zones as well as the overall cleanliness are significant for the maintenance of ecological balance. Therefore, pedestrian zones not only have to meet economic and social needs but also should be a place that would be pleasant to come back to.

The object of this article are the main pedestrian zones of Kaunas city. The research was conducted by applying the analysis and synthesis research methods.

1. Introduction

Currently, urban population accounts for 54.5% of global population. However, it is believed that by 2050 urban population will constitute even 66% (World Cities Report 2016). In many developing countries and their cities such rapid urbanisation and urban development cause various environmental problems, such as water and soil pollution (Vardoulakis et al., 2016), waste disposal problems, climate change. Rapid urbanisation in cities also results in transport intensity, which increases the growth of environmental pollution and noise. As a result, work capacity, economic productivity, urban climate and human health deteriorate (Vardoulakis et al., 2015; Shagufta et al., 2016). This means that the quality of environment is closely linked to social and economic aspects.

It is noted that due to increasing traffic flows, noise and pollution, city centres became less attractive and people no longer want to spend time there. In order to improve the

* Institute of Land Management and Geomatics, Faculty of Water and Land Management, Aleksandras Stulginskis University, Kaunas/Lithuania.

** Faculty of Environment and Civil Engineering, Latvia University of Agriculture, Jelgava/Latvia.

*** Department of the Built Environment, The Built Environment and Sustainable Technologies Research Institute, Faculty of Engineering and Technology, Liverpool John Moores University, Liverpool/UK.

environment as well as social and economic aspects, the streets of city centres are turned into pedestrian zones (Nikhil and Neetishree, 2016), which from ancient times to the end of the 19th century used to meet the needs of the city and its residents. It used to be the centre of public life of urban community, where people came to communicate, do shopping, take a walk, relax, participate in celebrations, etc. (Jakovlevas-Mateckis, 2012) However, as already mentioned above, the structure of the city has changed dramatically with the appearance of cars (Jou, 2011). Streets became noisy and polluted with dust and gas (Blanco et al., 2009) and thus making people feel insecure (Jakovlevas-Mateckis, 2012). What is more, fossil fuel used by motor vehicles are the main source of greenhouse gases in urban areas (Costa et al., 2014; Xia et al., 2015). However, a sustainable city must aim at mitigating the environmental impact and become the place designated for improving the quality of life of people (Dassen et al., 2013). In order to improve air quality and reduce greenhouse gas emissions in city centres, some European cities such as Hamburg (by 2034), Madrid (by 2020), and Oslo (by 2019) have decided to ban private transport in cities. Similar initiatives are being carried out in Helsinki, Paris, Copenhagen, Brussels, Dublin, Milan, Chengdu, and Bogotá by investing in public transport and bicycle infrastructure, and pedestrian streets (Nieuwenhuijsen and Khreis, 2016). Thus, special attention is paid to more environmentally friendly and more people-oriented measures.

The object of the article is the main pedestrian zones of Kaunas city.

The aim of the article is to analyse the most important environmental criteria of Kaunas city pedestrian zones, like air pollution and noise.

The environment and its quality are very important factors influencing the attractiveness of the pedestrian zones. Therefore, it is important to recognize the benefit of pedestrian zones from environmental perspective, such like as air pollution and noise, as much as from social-economic perspective.

2. Materials and methods

The research object is one of the biggest (second by size) Lithuanian cities – Kaunas. Based on the data of 1 July 2017 provided by Statistics Lithuania, there were 290'068 residents in Kaunas city. The main street of the New town is Laisvės avenue (Fig. 1), which together with Vilniaus street in the Old town is considered to be the longest pedestrian zone in Eastern Europe (Andriukeviciute et al., 2015).

In the course of the research, the analysis of the topic's relevance and related issues to the possible solutions were based on methods of analysis, synthesis and synthesis of literature sources.

The main statistical data related to the survey of air pollution and noise levels in Kaunas pedestrian zones were obtained from the Public Information Portal for Environmental Protection. These data are analysed in detail, structured in comparison with the permissible limit values and summarized in tabular form.

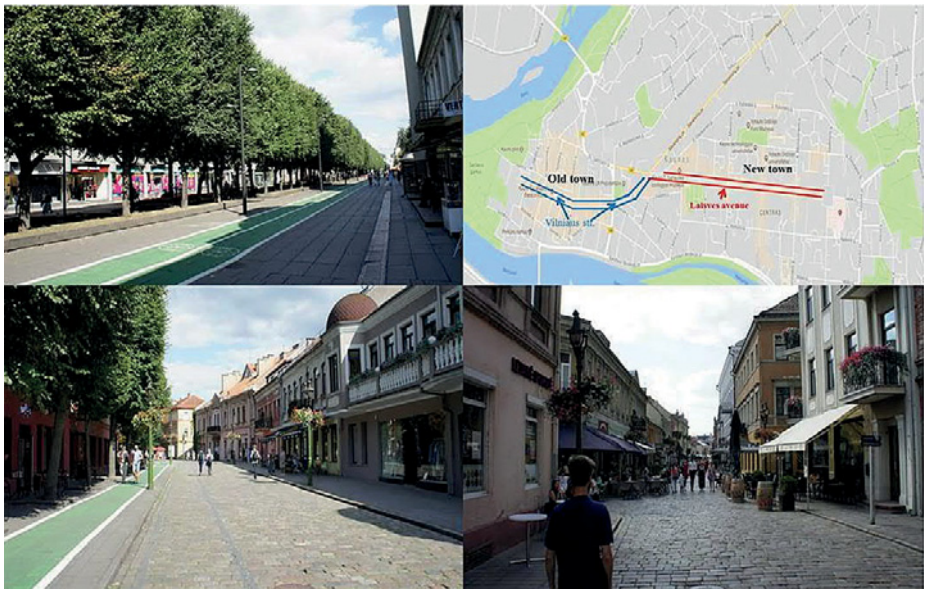

Figure 1: Kaunas city: Vilniaus street and Laisvės avenue (photos by Ruta Diciunaite-Rauktiene, map adopted from Google Maps).

Based on the results of the analysis of the environmental quality data of the pedestrian zones of Kaunas city, the conclusions and suggestions were formulated.

3. Discussions and results

Environment is a very important factor that influences person's mental, physical and social wellbeing. Air pollution and noise of the city are the key factors that may worsen the life quality in the city and its residents as well as cause various diseases (Ballesteros et. al. 2014). The air pollution and noise of cities can be caused by motor vehicles. As the majority of vehicles are in the cities inhabited by the majority of population, it is plausible that the residents of cities are mostly affected by poor air quality and noise (Nieuwenhuijsen and Khreis, 2016). Taking this into consideration, the majority of cities are currently seeking to reduce or stop using cars in cities and to develop pedestrian zones thus encouraging walking and reducing the greenhouse gas emission. However, it is universally agreed that the benefits of pedestrian zones are not only environmental (Diciunaite-Rauktiene et. al. 2018) (Fig. 2).

Economic benefit

Pedestrian zones can increase the value and rent rate of residential and commercial objects. Furthermore, the majority of businessmen claimed that the conversion of areas into pedestrian zones doubled their sales. Excluding the increased sales, pedestrian zones increase the employment of residents as such zones allow creating new work places (Nikhil and Neetishree, 2016) and promote tourism (Saynajoki et al., 2014). Limiting the use of private vehicles in a city and having a properly developed public transport infrastructure increases

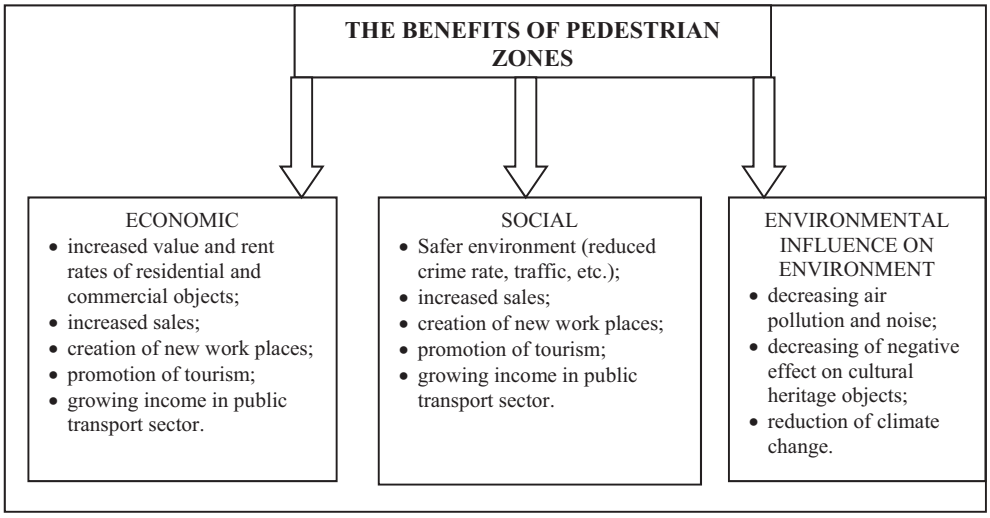

Figure 2: The benefits of pedestrian zones (Diciunaite-Rauktiene et. al. 2018).

the number of people using public transport, while increasing the income received from public transport sector (Nikhil and Neetishree, 2016).

Social benefit

Research has shown that pedestrian zones in a city influence the mental and physical health of its residents. Pedestrian zones promote walking, encourage social interaction, place attachment and greater safety. Furthermore, walking in pedestrian zones positively affects mood, thinking, relieves stress, symptoms of depression (Nikhil and Neetishree, 2016), reduces the risk of high blood pressure, stroke, high cholesterol (Lee et al., 2010), overweight and obesity (Olabarria et al., 2014).

Pedestrian zones influence the reduction of noise level as well. Noise is considered the second factor (after air pollution) that causes the development of fatal diseases (WHO, 2014) and negatively affects life quality (European Environment Agency, 2014). Is it speculated that in Europe, from 400 to 1500 million of residents suffer from diseases caused by noise (Hanninen et al., 2014). The studies have shown that the noise caused by cars causes cardiovascular diseases, sleep disorders (Basner et al., 2014), hearing impairment, headache and depression (Ko et al., 2011). On the other hand, the more time we spend sitting, driving a car, the higher is the risk of cardiovascular diseases, diabetes, various forms of cancer (McCormack and Virk, 2014; Sugiyama et al., 2016), overweight (Mueller et al., 2015). Based on the data acquired during the conducted research, it was observed that replacing riding a car with walking or riding a bicycle results in a positive effect on health (Humphreys et al., 2013; Kelly et al.,2014). In the majority of cases the pedestrian zones are characterised by a greater variety of green areas, which also positively affect the health of city residents (de Vries et al., 2013; Hartig et al., 2014), improve physical activity (Evenson et al., 2013), contribute to the social wellbeing of the residents (Mansor et al., 2012) and motivate their social interaction (Krellenberg et al., 2014).

Environmental benefit, influence on environment

It is universally agreed that good quality pedestrian zones should firstly be safe in terms of motor vehicles (Sisman, 2013; Asadi-Shekari et al., 2015), including not only pedestrian safety, but also their protection against the pollution emitted by vehicles. Air pollution caused by vehicles is considered to be one of the most serious problems in cities (Guerrero et al., 2014), as it causes hazard to the health of the residents (Costa et al., 2014; Bhalla et al., 2014; Hansen et al., 2014) by increasing the incidence of respiratory, cardiac, nervous system and vascular diseases (Cesaroni et al., 2014), influencing lung oncologic diseases (Raaschou-Nielsen et al., 2013), exacerbations of asthma (Gasana et al., 2012), emergence of diabetes (Eze et al., 2015) and mortality (Héroux et al., 2015; Lelieveld et al., 2015; Mueller et al., 2015). Specifically, air pollution caused by motor vehicles conditions early death and shortens the life of the residents of Europe by 9 months. It is believed that approximately 184'000 of people in the world die of air pollution (Bhalla et al., 2014). Therefore, it can be stated that air pollution undoubtedly has a negative effect on life quality. However, studies show that in city centres air pollution negatively affects not only the health and life quality of residents, but also historic buildings, monuments, cultural heritage (Ortiz et al., 2017). Based on the data of conducted research, the walls of buildings (especially those situated near the roadways) are directly affected by vehicle pollution, have a greater concentration of sulphate, nitrate and organic carbon (Ozga et al., 2013) which cause the black crust (Ruffolo et al., 2015).

Stopping the use of vehicles and using public transport, walking or riding a bike more frequently will reduce the emission of carbon dioxide (CO_2) and other greenhouse gasses, such as carbon dioxide, carbon monoxide as well as climate change (Saynajoki et al., 2014). The data of the conducted research shows that stopping/limiting the use of cars (at least one day a week, i.e. on Sunday) in some parts of Kaunas city, the amount of nitrogen dioxide dropped by 40 per cent (Willsheras, 2015), the amount of black carbon by 75–78 per cent (Invernizzi et al., 2011). Furthermore, in 2009, when a part of Broadway and Times Square in New York was closed for cars (for a trial period of 6 months the Square was accessible to pedestrians only) it was estimated that the concentration of NO and NO_2 pollutants was significantly lower, with NO pollution level decreasing by 63 per cent, and NO_2 level decreasing by 41 per cent (NYC DOHMH, 2012). Stopping the use of cars for at least a day (for instance Sunday), the noise level decreases by 10 dB (Brussels Environment, 2015), which, as it has already been mentioned, negatively impacts the physical and mental health of a person. Although there are studies that argue that the speed limitation may reduce noise as well (as it is seen in the case of Austria, Graz city, where the reduction of speed from 60 km/h to 30 km/h in residential areas resulted in 2.5 dB lower vehicle noise; European Environmental Bureau Towards quieter cities, 2011), it is known that the reduction of speed (40mph (64,3 km/h) might increase air pollution (UK Government, 2017) – for example The Edinburgh Centre for Carbon Innovation (ECCI) research showed that cutting speeds increased nitrogen oxides, carbon dioxide emissions and particulates (Barth, 2013), some similar results were found in Catalonia (Spain) (Bel and Rosell, 2013) and in Netherlands

(Dijkema et. al. 2008) – that might cause "acceleration and braking in stop-start driving" (Bostock, 2017).

Noise can be reduced with the help of green zones/areas. Green zones not only reduce noise, but also contribute to the elimination/reduction of air pollution (Escobedo et al., 2011), reduces high air temperature (Khreis et al., 2016) by casting a shadow and cooling the area, thus reducing the risk of heat-related diseases of the residents of cities (Wolch et al., 2014).

Thus, as it can be seen, pedestrian zones provide wide-ranging benefits including economic, social and environmental benefits. The article discusses environmental benefits and the importance of pedestrian zones in greater detail, since, as it has been mentioned, although pedestrian zones used to be developed for communication, shopping and socialisation, due to rapid urbanisation and increased traffic flows, pedestrian zones are now being developed primarily to improve the quality of environment and life of city residents.

The General plan of Kaunas city (2013–2023) indicates that road transport pollution accounts for 80% of overall pollution. The greatest level of pollution is observed in the city centre. What is more, based on the data of monitoring programme, pollution is increasing every year.

The greatest issue concerning air quality in European cities is the concentration of fine particulate matter (PM_{10}), which is above the level of the standards and the main source of which is motorised transport (European Environment Agency, 2016). In the central part of Kaunas (as well as in pedestrian zones, i.e. Laisves ave. and Vilniaus street), the concentration of particulate matter (PM_{10}) is close to the limit value (50 μg/m3 (European Environment Agency, 2016) (Table 1). However, it is presumed that at certain hours (peak hours) or when festivals are taking place in pedestrian zones, they may exceed the allowable rate. Consequently, although pedestrian zones in Kaunas are partially free of motor vehicles, pedestrian zones can still be affected by car emissions.

The worst situation in the pedestrian zones of Kaunas city are observed in case of concentration of benzo(a)pyrene (BaP), as it exceeds the limit value (Table 1).

Noise is considered to be excessive when its level exceeds 55 dBA during day and 50 dBA at night (European Environment Agency, 2014). Although pedestrian zones in Kaunas are partially free from the traffic, Kaunas City Strategic Noise Map indicates that the noise level in both Laisves avenue and the Old Town is 65 dBA, which exceeds the permissible limits.

Thus, having analysed air pollution and noise indicators of Kaunas city pedestrian zones, it can be stated that despite the fact that not all indicators reach limit levels, air quality in the central part of the city nevertheless poses a certain concern, in particular due to the excessive noise level and limit concentration of particulate matter in ambient air. Therefore, it is presumed that Kaunas city pedestrian zones are not adequately protected from pollution and noise, and as a result, the main pedestrian streets of Kaunas city do not perform their main function, they are not used sustainably.

Table 1: The main indicators of air pollution and noise in Kaunas city pedestrian zones (Environmental Protection Agency, 2016, Environment Agency, Noise and pollution map of Kaunas city, 2017)

Indicator	Indicator value	Limit value
Maximum 24-hour particulate matter (PM_{10}) concentration ($\mu g/m^3$)	46–50	50
Maximum 24-hour sulphur dioxide (SO_2) concentration ($\mu g/m^3$)	26–27	125
Maximum 8-hour moving average carbon dioxide (CO) concentration (mg/m^3)	3.1–3.3	10
Annual mean benzo(a)pyrene (BaP) concentration (ng/m^3)	1.1–1.8	1
Maximum 1-hour nitrogen dioxide (NO_2) concentration ($\mu g/m^3$)	110–120	200
Noise	50–65	Up to 55 dBA during day Up to 50 dBA at night

Kaunas City Municipality should take into account the diseases/illnesses and mortality rate caused by air pollution and noise, and seek to protect the public health by reducing the cars flow around pedestrian zones, while at the same time reducing greenhouse gas emission. In addition, Kaunas city municipality should pay a particular attention to improve the infrastructure for public transport cycling and green spaces.

4. Conclusions

The quality of health and life of city residents depends on the quality of ambient environment. Particular emphasis is paid to the importance and benefits of pedestrian zones, as increased air pollution and noise, the lack of green zones and insufficient physical activity in European cities cause the morbidity and mortality associated with these phenomena. Meanwhile, pedestrian streets not only improve people's physical and mental health, but also reduce noise levels, air pollution and greenhouse gas emissions.

Having carried out the analysis of the indicators of Kaunas city air quality and noise, it was observed that noise levels in Kaunas city pedestrian zones exceed limit levels and that there is an increase in the concentration of benzo(a)pyrene, while the amount of particulate matter reaches the limit value. Taking these results as well as the results of the reviewed research into consideration, Kaunas city municipality must pay particular attention to the limitation of traffic flows in the city, the development and improvement of public transport and bicycle infrastructure, and green spaces.

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Olga Petrakovska*, Darya Kuznetsova*

Peri-Urban Area and Particular Qualities of Land Use

Abstract

Peculiarities of land use within peri-urban areas are related to the specifics of these territories. The exclusivity of these zones is determined by the dependence of their development on the cities-centres on the one hand, and the need to ensure the needs of society not connected with the cities-centres on the other hand. In this article a comparative analysis of the interpretation of the suburban zone by different scientists was carried out, features of overlay of functions performed by the peri-urban area and possibility of their delimitation in space are considered.

1. Introduction

Urban development has a lot of positive effects as a reflector and indicator of economic growth. But it can also have serious negative social and environmental effects. With urban sprawl, the impact of social, economic and environmental change is particularly acute in peri-urban areas. Peri-urban areas achieve additional profits from proximity to urban area, which usually concentrate markets of labour, culture, different services, etc. But, at the same, time peri-urban areas suffer from urban pressure. Even without the expansion of built up area, there are urban pressures on peri-urban areas such as transport congestion, decline of landscape quality, social changes and uncontrolled restructuring of land use. Urban sprawll sometimes increases negative ecological effects on the peri-urban area (Caruso, 2001).

European Environment Agency defined urban sprawl as unplanned incremental urban development, characterized by a low density mix of land uses on the urban fringe. According to UK Planning Portal Glossary of planning terms, urban sprawl is the uncontrolled or unplanned extension of urban areas into the countryside. Another definition of urban sprawl says that it is low density, scattered urban development, without systematic large scale or regional land use planning (Reckien, Karecha, 2007).

So urban sprawl is a phenomenon that has powerful negative effects. That point of view is supported by negative consequences in environmental, economic, social spheres of life that appear as a result of urban sprawl. In the same time, urban sprawl is not an absolutely negative phenomenon. It is just the inevitable consequence of population growth, development of economy and scientific and technical progress in the world. If we suppose these three facts

* Kyiv National University of Construction and Architecture, Department of Land Management and Cadastre, Kyiv/Ukraine.

as starting point, we cannot avoid facing the fact of urban sprawl. If we assume that population growth is something that cannot be changed, as well as the inevitableness of development of economy and scientific and technical progress, we have to confess that urban sprawl is something unavoidable because of human activity.

It should be noted that key words in the most part of definitions of urban sprawl are "unplanned and uncontrolled". So the goal is not to find way to refuse, to ignore or to cancel urban sprawl, but to organize effective system of governing of processes that appeared as a result of urban sprawl.

One of the key elements of effective regulation system in urban sprawl processes is a land use system. Land is a key component of any human activity. It provides society with territorial basis for any type of economic or social activity. It is a factor of production in agricultural land use. Likewise the land is a natural resource with variety of features that provide different aspects of society's life. That is why the system of land use can be considered as background for any complex strategy oriented on processes' governing of territory.

2. What a peri-urban area is?

Peri-urban areas are territories, which are involved in process of urban sprawl and suffer from unplanned, disorganized system of land use. Effective system of land use is one of the main goals within sustainable development of territory. The effectiveness of the management of any system depends on the definiteness of the system's components and their interrelationships.

Almost 40 years ago scientists in their attempts to identify what is peri-urban area noticed that "the term peri-urban area cannot be easily defined or delimited through unambiguous criteria. It is a name given to the grey area, which is neither entirely urban nor purely rural in the traditional sense; it is at most the partly urbanized rural area. Whatever definition may be given to it, it cannot eliminate some degree of arbitrariness" (OECD, 1979).

The analysis of contemporary theoretical and practical vision of peri-urban territories is carried out in the article. According to the statements of European scientists, peri-urban areas are often understood to be mixed areas under an urban influence but with a rural morphology (Caruso, 2001). Often they are used to describe newly urbanized zones at the fringes of cities (McGregor, Simon, Thompson, 2006, Adell, 1999).

Often scientists use the term "transition area" in their definitions of peri-urban territory. For example, the peri-urban area is a transition area moving from strictly rural to completely urban, related to a high pressure of urban development (Bertrand, 2007). Other view of peri-urban area refers it to a transition or interaction zones, where urban and rural activities are juxtaposed, and landscape features are subject to rapid modifications, inducing by human activities (Douglas, 2006).

Also there is an opinion that peri-urban areas are zones of transition from rural to urban land use located between the outer limits of urban and regional centres and the rural environment. According to definition of European Environment Agency, peri-urban area is the dynamic transition zone between the denser urban core and the rural hinterland (Piorr et al., 2011).

At the same time, researchers note that the peri-urban area – it is not just something uncertain, transit, but can be characterized by the general trends of use (Briquel, Collicard, 2005). Council of Europe conference of ministers responsible for spatial/regional planning noticed that transition is carried out in a certain sequence. First stage is a formation of urban-rural interface. Eventually they can transform into completely urban territory or stay mix of rural and urban territory (CEMAT). The second case is more complicated and requires creation of new effective approach for land use regulation.

As a result of analysis of scientists' opinions it is evident that they consider peri-urban areas through socio-economic changes, quality of life, lifestyle, and economic activity. Friedmann mentioned that the development of suburban areas involves not only the expansion of the city in the spatial aspect, but also the change of functional content (changing in activities, lifestyle, social orientation, similar to urban stereotypes and so on). He makes accent that this area is a zone of influence of city (Friedmann, 1996). Another researcher noticed that peri-urban area is not only a zone of direct impact of city-centre. This area is recognizable due to extended agricultural landscapes, forest and other natural resources (McGregor, Simon, Thompson, 2006).

Ukrainian researchers' opinions are corresponded with this approach. They concentrate attention on type of land use existing in peri-urban areas. So, peri-urban area defined as the area outside the city, which includes forests, parks and other green spaces, territories for public recreation, suburban settlements, agricultural land, industrial enterprises that serve the city and focused on local raw materials (Treshnikov, 1988). Another definition focused on examining peri-urban area in terms of the economic centre and its connection with attached area, indicates that the peri-urban zone is a territory around the urban area, functionally connected with it through supplying of goods and services, employment (Smoliy, Fedorchenko, 2006).

Moreover, the settlements of various sizes are also located in peri-urban areas, especially in agglomeration zone of large cities and are the part of these zones. Therefore, the statement of the researchers that settlements located around city should considered as independent from the city or associated with it by partnerships, not subordinated, relations is fair and reasoned (Lappo, 1997).

Analysis of existing definitions of peri-urban areas shows the absence of universal definition. But most of scientists agree that the type of land use is a key aspect of definition of peri-urban area.

From authors' point of view peri-urban area should be acknowledged as area that includes parks, green spaces, territories for public recreation and other services that maintain the city-centre and other settlements from one side and area with agricultural land, forests, industrial

enterprises etc. that serve population not only contiguous cities but regions and sometimes even country. Development of peri-urban area should not be subordinated to interests of city-centre and associated with it by partnerships.

3. Where is a boundary of peri-urban area?

Studying the definitions of peri-urban area it is became evident necessity to understand where its boundary is. One of the aims of the study is an attempt to reveal where is a boundary of peri-urban area, how it could be defined and is it necessary to know particular position of peri-urban area's boundary in the space.

The more city-centre the more urban type of activity spreads outside the city's boundaries. Accordingly, peri-urban territory is not separate spatial element; it creates a single complex with urban area. So, the peri-urban areas and all processes that are related to land use should be analysed on the level of the whole urban-rural system comprehensively.

The problem of peri-urban delimitation arises from the uncertainty of the concept of the peri-urban area. According to Oxford Advanced Learner´s Dictionary boundary is a line that marks a limit; dividing line. According to Meeriam Webster dictionary boundary is a point or limit that indicates where two things become different. It is noted that boundary is something (such as a river, a fence, or an imaginary line) that shows where an area ends and another area begins. So, in order to define the boundary, it is necessary to understand difference between areas which are considered as spatial elements of urban-rural system.

Scientists in their studies of urban territory and territory around it use the term 'rural–urban-region' (RUR) as the integrated unit of analysis (Figure 1). Most visually and structurally the interconnection of city centre with other areas is shown in the figure given in Synthesis report about peri-urbanisation in Europe.

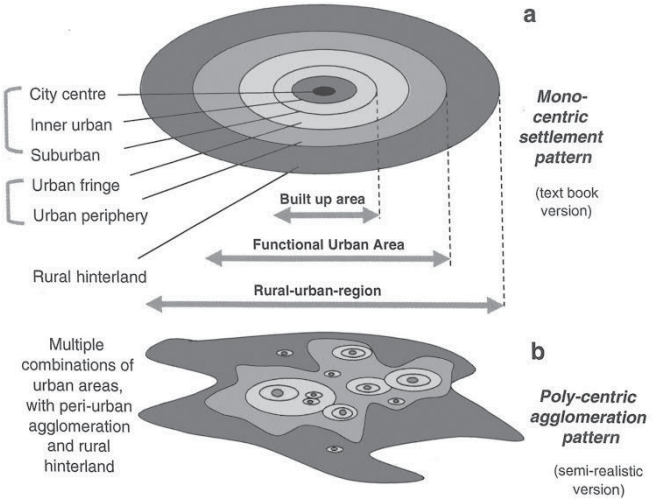

Figure 1: Concept of peri-urban areas and rural–urban-region (Piorr et al., 2011).

In this source peri-urban is considered as one of the three elements that form rural-urban-region (RUR): urban area, peri-urban area and rural hinterland. Peri-urban area borders with urban one that consists of city centre, inner urban and suburban. The outer border of peri-urban coincides with border of rural hinterland. Peri-urban area consists of urban fringe and urban periphery. Urban fringe is a zone along the edges of built-up area, which includes scattered settlements around transport nodes, large green spaces, forest, agricultural land and other spaces without hard human activity pressure. Urban periphery is a zone surrounding the main built up areas, with a lower population density; it can include smaller settlements, industrial areas, other urban land-uses, and agricultural land use.

So, peri-urban is a zone between area characterized by mostly urban type of activity and area characterized by mostly rural type of morphology.

In reality, the described model, which is focused on radial-ring plan structure (Figure 1a), cannot take into account all the spatial, geographical, historical, economic etc. particularities of the territory of RUR. In this source in addition to monocentric city system, it is proposed regional polycentric system that is more consistent with reality (Figure 1b).

As a result of research, authors noted that spatial components in polycentric model are not just surround each other, but sometimes overlap through infrastructure development and socio-economic connections. For example, in the case of zones overlapping the urban fringe can be superimposed over urban periphery or over rural hinterland. But it is very important to note that capacity of types of land use and activities are different in variety zones (Figure 2).

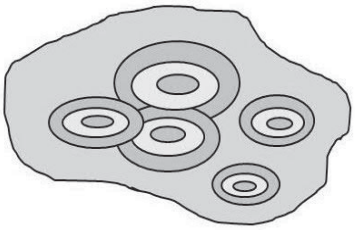

Figure 2: Polycentric settlement model with overlapping zones.

The research carried out by the authors reveal the impossibility of the legible delimitation of the peri-urban area's boundaries in space. Size of zones depends on size of settlements and capacity of socio-economic and transport links, potential of natural resource and many other factors. Creation of effective land use regulation system requires revealing all factors that identify the spreading over of these zones.

4. Particular qualities of land use in peri-urban area

An important moment in determining the characteristics of land use types is the identification of the main functions that peri-urban areas should perform. Based on the analysis of the judgments of researchers and spatial documentation of Ukrainian cities, the authors summarized the functions of peri-urban areas and aggregated them into following groups:

- function of city-center maintenance (transport and engineering infrastructure, recreation, entertainment, trade, etc.);
- function of maintenance of settlements in peri-urban area (the same as in previous);
- function of conservation of natural resources (forest, water resources, landscape, soil, flora and fauna, etc.);
- function of providing agricultural products (plant growing and cattle breeding);
- function of pressure relief of urban territory (taking out of industrial enterprises, airports, waste treatment facilities, large trade and logistic centers and others from urban area);
- function of providing communication link between settlements, cities and regions (transport and engineering infrastructure regional and national level).

Characteristic features of land use in the peri-urban areas are explained by their functions described above.

Frequently problems of the providing these functions are associated with the need to allocate the land. The solution of these problems is complicated because of following reasons:

- lands of peri-urban area are not administratively lands of city-centers around which they are created and are not in direct administrative and legal subordination of particular city.
- lands of peri-urban area belong to other municipalities and have their own bodies of local self-government.
- lands of peri-urban area constitute the joint social, natural and economic territory of the city-center and settlements beyond its borders.
- disposal of the land of peri-urban area sometimes is responsibility of the regional and national authorities.

Therefore, effective land use in peri-urban area is possible only under condition of simultaneous consideration of interest at local, regional and national level.

5. Conclusions

The land use management within peri-urban areas is forced to be developed in the absence of absolutely clear definition of the term of peri-urban area. Analysis of existing definitions of peri-urban area shows the absence of universal conception about peri-urban area. Elaboration of universal definition is not a goal but a step for comprehension of peri-urban area's features and problems connected with land use within it.

The research carried out by the authors reveal the impossibility of the legible delimitation of the peri-urban area's boundaries in space, because these boundaries are dynamic. They are affected by the trends of the cities' development, natural conditions, socio-economic connections, particularities of spatial interlacement, etc. The establishing of such boundaries is necessary for the solution of administrative issues regarding the disposal of lands, for mass valuation of lands, etc. and should be the task of spatial planning.

The problem of effective land use in the peri-urban area caused by aggregation of various functions of local, regional and national level and subordination of different authorities.

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Mykola Trehub*, Yulia Trehub*

Factors Influencing Sustainable Industrial Land Use at Different Levels of Spatial Planning in Ukraine

Abstract

The article is devoted to the study of industrial lands in Ukraine and the systematization of factors that affect the sustainability of their use. It is determined that the land use system is based on different hierarchical levels, which, in turn, presuppose different types of documentation. Different levels of planning of the territories are systematized in relation to the levels of development of documentation for land management. The factors that have the greatest influence on the sustainable development of industrial lands are determined considering the hierarchical component. The components of each factor are systematized using the method of comparative analysis. The results of the study allow us to make conclusions and suggestions for the best possible description and account of the identified factors to increase the sustainability of land use in industrial areas.

1. Introduction

In Ukraine, the use of industrial lands for different specific purposes along with agricultural ones forms the overwhelming part of the country's gross domestic product (GDP), while taking up not more than 4% of the entire territory. Various aspects of the rational use of agricultural lands (incl. agricultural, economic, technical etc.) are investigated carefully and in detail, since the priority of the use of this land is determined at the state level. In turn, the land of industry and industrial areas is virtually unexplored, although the scientists' attention is focused on certain laws of the emergence, development and management of industrial enterprises. The only direction of development of industrial territories, which is defined at the legislative level in Ukraine, is the creation of industrial parks (Land Code of Ukraine, 2001). The limitations for their creation are only the area of the land plot that is allocated. Industrial parks are created on land parcels of not less than 15 hectares and no more than 700 hectares (Law of Ukraine on industrial parks, 2012).

Fig. 1 shows the total number of industrial parks established in Ukraine and the distribution of phases of their creation over the years.

By analyzing the data in Fig. 1 it can be determined that since the law entered into force there is no rapid increase of industrial park´s development or the transformation of existing production. Before 2014 the old factories and enterprises were modernized without their transformation to industrial parks. Moreover, there is an uneven distribution of industrial parks in the territory of the state, as well as their absence in the central and eastern regions,

* Dnipro University of Technology, Department of Geodesy, Dnipro/Ukraine.

Figure 1: Distribution of registered industrial parks in Ukraine (Source: https://theubj.com/).

where traditionally most of industrial enterprises were situated. Obviously, this situation is associated with a number of objective and subjective factors. However, we believe that the enterprises of central and eastern regions could be easily transformed to industrial parks. In this case, the industrial areas in each region will be compactly placed giving priority to the development of agricultural land. Such land-use transformation will be beneficial for all players of land market.

Based on the situation mentioned above, there is a logical need to adopt similar approaches of sustainable land use for industrial lands as for agrarian ones. But the key problem is to find differences and peculiarities – factors of sustainable land use of industrial areas at different planning levels.

2. Current situation

The issue of sustainable development of territories in Ukraine are addressed by specialists of two priority areas: urban (spatial) planning and land management. In accordance with the current normative legal acts of Ukraine (the Laws of Ukraine on land management 2009 and on urban planning 2011, the order of the spatial documentation development 2011) there are 3 levels of development of both urban (spatial) planning and land management documentation: national (state), regional and local. The corresponding levels, types of documentation and responsible state or private enterprises for their development are systematized in Fig. 2. It should be noted that despite the fact that the development levels coincide, and also the classification mark of different types of documentation coincides, the contents of the documentation is fundamentally different. The departments that are responsible for the verification of documents, as well as their submission to the executive authorities, are also different.

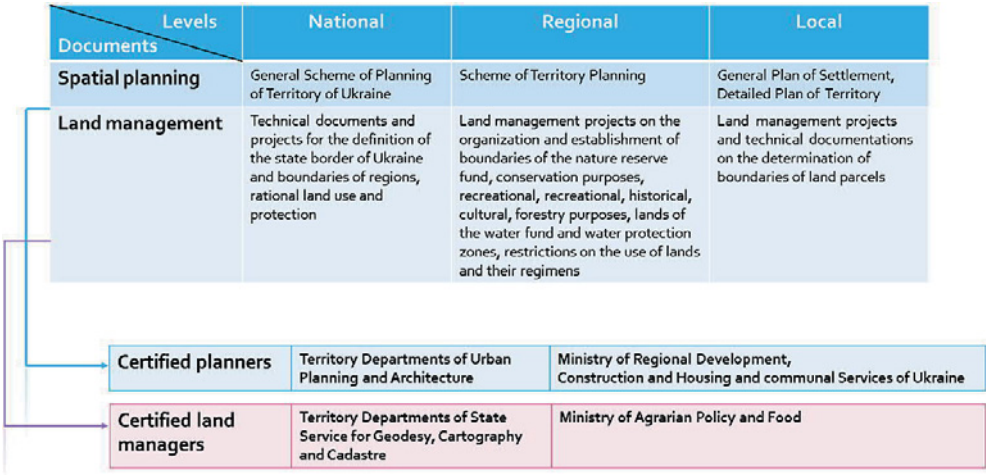

Figure 2: Levels of land management and spatial planning in Ukraine.

Each of the levels of the development of a particular documentation is characterized by a set of components that affect the use and protection of land and is the basis for the development of relevant documentation. In the framework of this study, these components are called factors of sustainable development of industrial areas. At different levels of urban planning and land management documentation, these factors are different. Table 1 summarizes such factors as location, geological situation, engineering geological situation, economic situation, ecological situation and planning features. Aggregated factors are defined for national, regional and local levels of land use, as well as additional comments on the impact of each of the factors on each level of land use. The information is based on the previous research (Tregub, 2015).

Table 1: Aggregated factors of industrial land use

LEVELS / FACTORS	National	Regional	Local
Location	Territory of a *region* relative to the territories of other *regions* in country	Territory of *each settlement* relative to *other ones* in a region	Each *land parcel* relative to other ones and the settlement in general
Geological situation	Geological *structure of the subsoil*	*Qualitative and quantitative indication* of minerals deposits	*Characteristics of possible extraction of mineral deposits*
Engineering geology	*Spread* of different *geology processes* in a country	Hydrogeological *regime of the region*	Landslides, karst and other possible *types of violation of soil cover*

LEVELS / FACTORS	National	Regional	Local
Economic	*Value* of territories	*Supply* and *Demand* of Land market	*Costs for development* of the territory
Ecological	State *legal acts* and *standards*	*Monitoring* and *control*	*Restrictions*
Planning	*Existing* and *actual* legal acts, standards and spatial planning documentation	*Structure* of economic activities of settlements	*Spatial characteristic of each land parcel*

The location of the land plot plays a crucial role and is the main factor on which all other indicators depend. The publication (Petrakovska and Trehub, 2017) systematized the distribution of industry in the territory of the state. Based on it, the components of the corresponding factor are determined at different planning levels (Fig. 3).

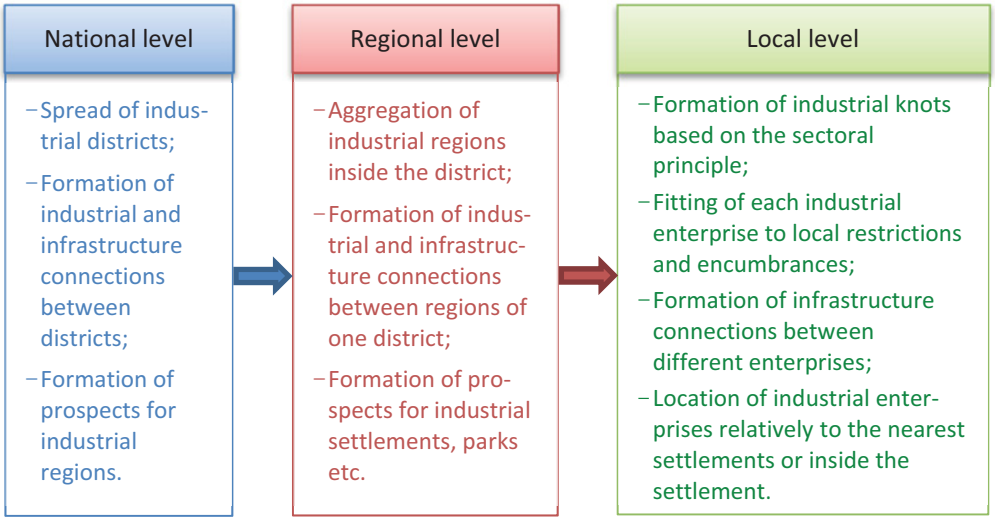

Figure 3: Components of "Location" as a factor of sustainable industrial land-use.

The geological situation is characterized by general characteristics regarding the distribution of minerals throughout the territory of the state, the calculation of their reserves, as well as the areas of the most successful mining. This factor not only has the greatest impact on the development of the mining industry, but it affects all the surrounding land. The general components of the geological situation are presented in Fig. 4.

The engineering-geological state is characterised by the features of the formation of subsoil, the hydrological regime under and on the surface, as well as the potential ability of

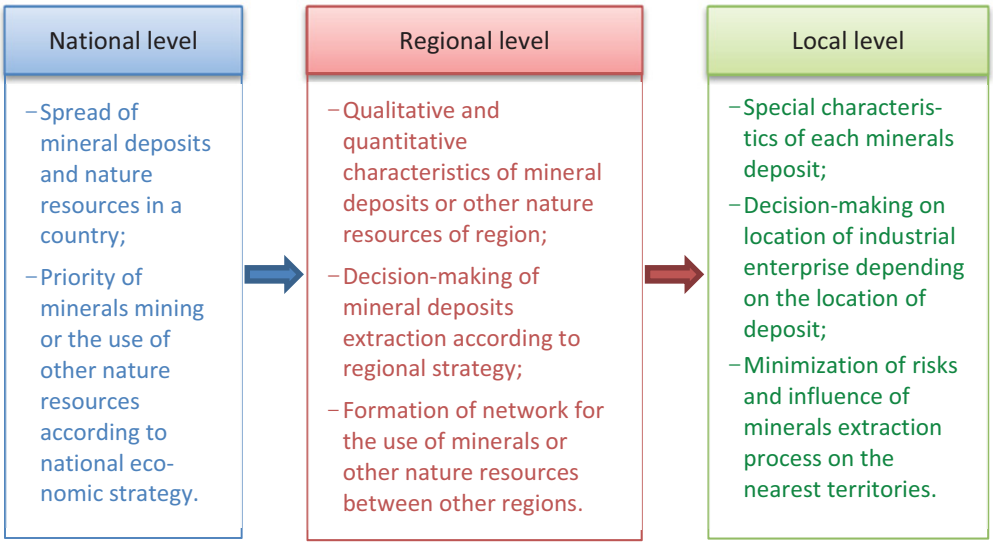

Figure 4: Components of "Geological situation" as a factor of sustainable industrial land-use.

landscapes to counteract the development of negative processes. Such processes could be the following: emergence of karst, landslides, violations due to mining, flooding, etc. The general distribution of components of the engineering-geological state is given in Fig. 5.

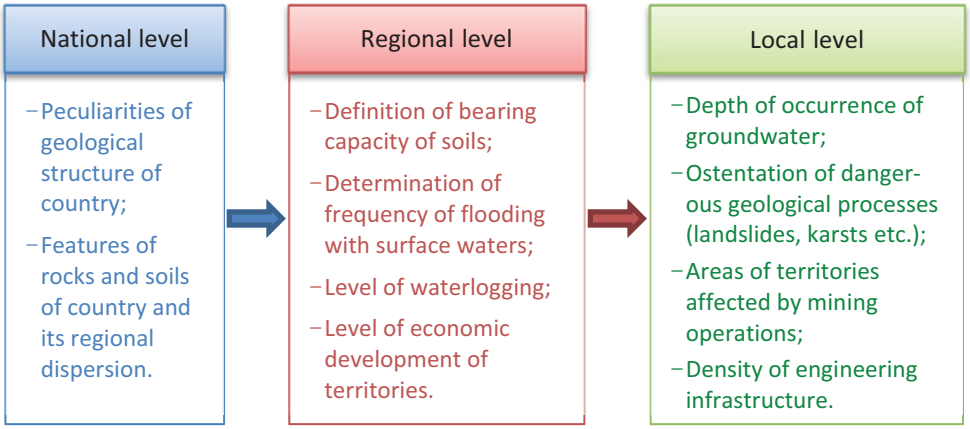

Figure 5: Components of "Engineering-Geological situation" as a factor of sustainable industrial land-use.

The economic situation is characterized by a number of factors at different levels of spatial development of territories. The most important are the level of income of citizens living in the respective territory, the amount of able-bodied population, the specifics of the tax system of each region, the level of development of small and medium-sized businesses, as well as the existence of specific favorable conditions for doing business (Trehub and Trehub, 2017).

Components of the economic situation as a factor for sustainable industrial land-use are shown in Fig. 6.

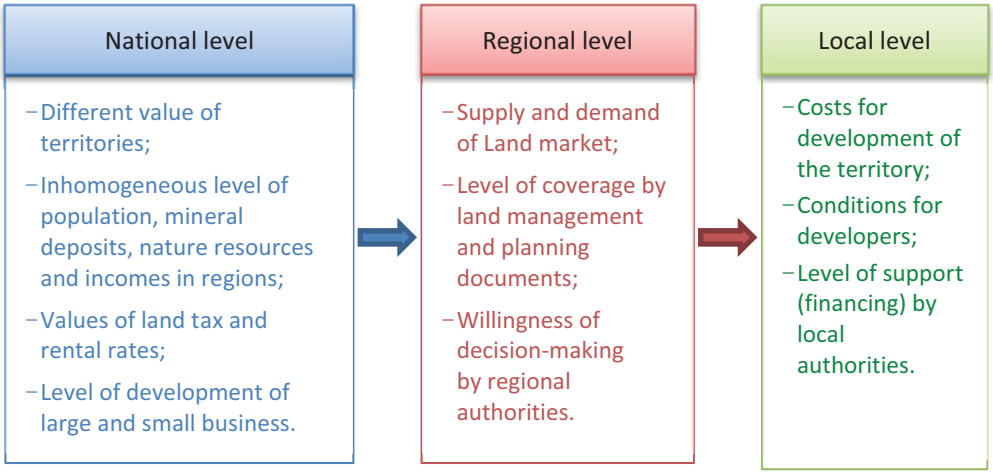

Figure 6: Components of "Economic situation" as a factor of sustainable industrial land-use.

The ecological situation as a factor for the sustainable development of industrial areas has a number of regulatory and legal instruments and instruments of direct action that help to resolve the problems of environmental protection from the negative factors. It is necessary to use two different components: direct impact on factors that negatively affect the environment and indirect or preventive impact. Direct actions include the introduction of measures to reduce or standardize pollutant emissions, while preventive measures include proper establishment of security zones and compliance with the regime of use of territories within them. In general, the factors that are systematised at different levels are determined in Fig. 7.

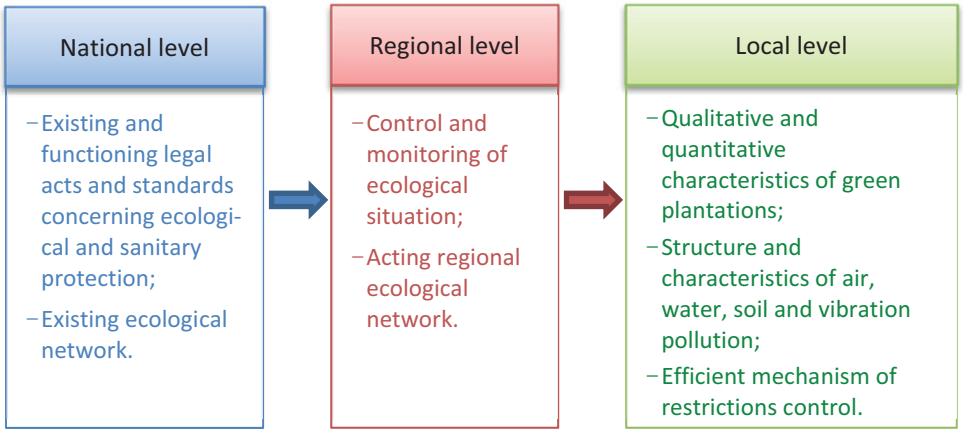

Figure 7: Components of "Ecological situation" as a factor of sustainable industrial land-use.

Specific features of planning make the factor that reflects the action of the whole set of factors described above, taking into account the definition of the perspective development of territories. Components of planning features are systematized in Fig. 8.

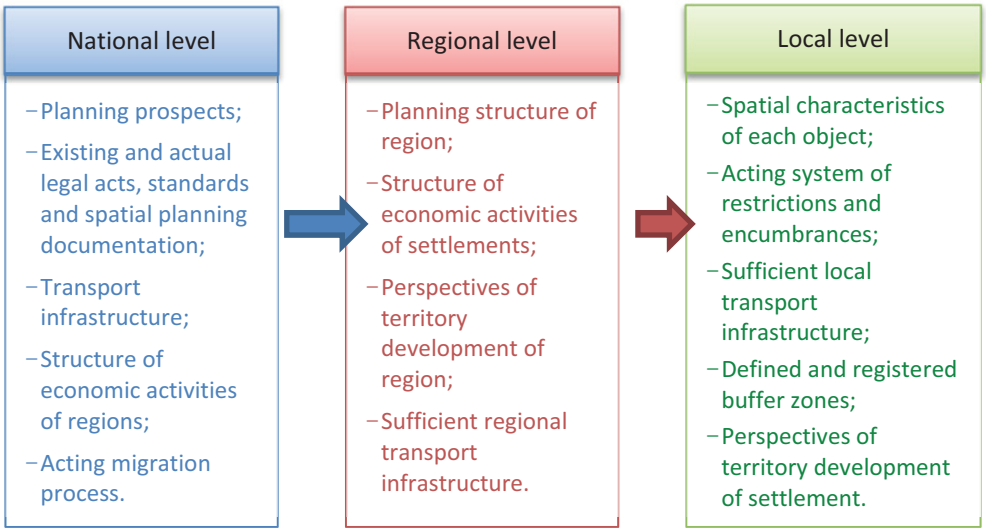

Figure 8: Components of "Planning" features as a factor of sustainable industrial land-use.

3. Conclusions

For the three levels of territorial planning, 6 groups of factors having the greatest influence on the sustainable development of industrial areas are suggested. For each group of factors, the quantitative or qualitative characteristics are identified according to the values of information for each of them. Each of the factors has an influence on the choice of areas for the development of industrial lands, but this influence should be expressed with numerical indicators and specific weight in comparison to others. In our opinion, the planning factor is important, which should consider practically all the features of the other five factors. Further research requires conducting a ranking of the relevant factors. In our opinion, the best methodology to process the data in this case will be the use of fuzzy set theory. It will provide the possibility to transform qualitative characteristics to numeric values. After the transformation suggested, it will be easy to calculate the influence of each factor on the sustainable development of industrial territories.

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Meltem Yılmaz*, Dilara Tüfekçioğlu*

The Limits for the Use of Industrial Buildings in Cities and the Role of Local Authorities

Ankara gas factory as a case study

Abstract

The rapid development of technology since the mid-20th century, has caused the industrial structures to lose their functions that emerged with the Industrial Revolution. It is possible to re-function these structures which have been idle for many years and are mostly located within the city and include them again into urban life. Re-functioning can be done for the preservation of all the structures or part of the structures and the creation of new areas of use. In some cases, it seems that all the structures of the industrial area have been destroyed and for the re-functioning, only the occupied land becomes important. In the process of demolition and reconstruction, respect for culture and the past is the basis. The approach and intent of decision-makers, the method followed for the destruction and re-functioning of the structures are crucial factors. There are many examples of refunctioned industrial structures in Turkey. In this study, as a current topic, the Ankara-Maltepe Historical Electricity and Gas Factory that is the first electric power plant of the Republic of Turkey, have been discussed. The plant, operated until 1990, was declared as a preserved area in 1991. Plant's preserved site status was abolished in 2006. From this date; a significant part of the structure was gradually demolished. As of February 2017, most of the structure of the factory has been demolished. Despite all initiatives, demolition could not be stopped. In this report, the limitations on the use and re-use, re-functioning of industrial structures which come into question with the demolition of Ankara – Maltepe Gas Factory will be discussed and the role of local Authorities and decision-makers in this area will be examined.

Keywords: *Industrial Structure/Area, Gas Factory, Re-Functioning, Preservation – Destruction, Local authorities, Industrial Heritage.*

1. Introduction

Humanity has undergone three important changes in the socio-economic development process: Primitive society developed to agriculture society, agriculture society to industrial society and nowadays from industrial society to information society (Aktan and Tunç, 1998: 119). The second great social and economic transformation, the industrial revolution, radically altered the built-up areas, along with the new functions it introduced in urban space as well as the scale of structures. It has completely changed not only industry sector, but also

* Hacettepe University, Faculty of Fine Arts, Departmant of Interior Architecture & Environmental Design, Ankara, Turkey.

the needs, the societies and all the old world order in the pioneer of Europe (Küreli, 2013: 6). Increased production capacity through rapid mechanization, transformed small businesses into large factories. Thus, "industrial structures" emerged as new type of buildings. Since then, besides technological developments, functional factors such as new production methods, new materials, technical equipments have triggered continuous change in industrial structures. Within time, they have lagged behind the changing technology-production systems and lost their functions when they become unable to respond to the consumer needs. Most of them were abandoned at the end of the 20th century. Turning into idle and vacant premises within cities undergoing the process of deindustrialization, these old industrial areas bear a double value as witnesses to a crucial period in the history of humanity and the very reason for existence (raison d'être) of why such period ever happened in the first place. For this reason, these buildings and areas constitute today's industrial heritage. The transfer of the industrial heritage to the next generations depends on integrating them into the city life with appropriate function and preserving their original values and identities.

In this context, Ankara-Maltepe Historical Electricity and Gas Factory are covered in this study. The factory is of great importance in the history of the Republic of Turkey. Because of this reason and reasons mentioned earlier, it is essential to transfer such an industry and cultural heritage to future generations. But, despite all conservation decisions, a significant part of the plant was gradually demolished in time. These destructions were carried out by local governments in accordance with the so-called law. Lastly, in February 2017, the power plant structure with 350 tons of asbestos material was destroyed by the local government without taking the necessary precautions. At this point, the purpose of the article is to present the difficulties of the conservation of industrial areas and to discuss the limitations on the re-use and re-functioning of industrial structures, against local Authorities and their decisions. Because, there is no justifiable reason for these destructions, which has caused the loss of a significant industrial heritage, which puts urban and urban health in danger, which constitutes a serious risk for human and environmental health. In this research, case study method from qualitative research methods has been used. For this, a literature search was conducted. During the data collection phase, observation and document analysis methods were used. Archive photographs, videos and written documents such as court decisions and newspaper reports were used for the related initiatives of local governments and non-governmental organizations. The current situation after the last demolition was photographed and observed in situ. The findings obtained by analysing the collected data were presented for discussion in the conclusion section.

2. Industrial revolution and industrial buildings as an industrial heritage

Industry includes the historical and social production technique among the "nature-man-product" trio (Özsırkıntı, 2014: 152). Mankind has had to produce and transform nature in order to exist throughout the history. Initially, they were the simplest forms of industry. It has gained its present meaning with the machine production and the term "Industrial Revolution" was first used by British economist Arnold Toynbee (Hançerlioğlu, 1981: 345).

Generally defined as the transfer from manual production (referred to as "manufacture") to machinery and the resulting shift to factory-based system, the Industrial Revolution took place over a long period of time, with the antecedent factors evolving from the 16th to the 18th century (Köksal, 2005: 6).

Factory system production as an extension of the industrial revolution, has emerged as a need as a result of increased demand for consumer goods. Thus, the working and production system in large buildings, where many workers and machines are located, was introduced. With the factory system, factory constructions and areas began to take part in daily life, and industrial production areas established quickly around the cities. It can be said that the most important effects of the industrial revolution are seen at socio-spatial, that is, at the social and urban level.

The AEG Turbine Plant (1908), which is considered the first modern building, (Batur and Batur, 1970: 34) and the Centenary Factory (1895) are the first examples of the use of the steel and concrete conveyor system and formal change. The Fagus Shoe Factory also has an important place in terms of the development of the construction systems of the period and its influence on the industrial structures. Besides these, there are industrial structures that are not buildings with functions instead, they have sculptural and monumental effects. In the second half of the 20th century, the changing urbanization practices, the transformation of production styles and techniques and the new technological developments have caused the old industrial buildings to become inefficient. They lose their productivity, becoming dysfunctional and useless. The formation of rent pressures on valuable industrial areas – which are remained in the city centre within time – have caused the industrial structures to be abandoned and threatened their extinctions. The Industrial Heritage concept has emerged to emphasize the necessity of protecting these industrial structures. The most comprehensive definition of industrial heritage today is in the 'NIZHNY TAGIL[1]' Regulation, signed in 2003 and prepared by The International Committee for the Conservation of Industrial Heritage (TICCIH).

3. Re-functioning of ındustrial buildings

In general, the most important reason for the threat of the extinction of old structures is that they are abandoned due to loss of function. The loss in the capacity of productivity in industrial structures, depending on time and technological developments, creates this inevitable outcome. The basic problems of these abandoned structures, due to loss of function, are the dismantling of structural elements and equipment from the structure in order to obtain a material value. The lack of maintenance causes the deterioration of the structures,

1 Industrial heritage consists of the remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education (icomos.org).

the need for new construction areas and the demand for the land where the facilities in the city centre are located, accelerates the demolition process.

By changing the function of the industrial structure with a more current one, the structure can be preserved and the efficiency can be maintained too. Binney et al. (1990) point out the benefits of these refunctioning efforts (in terms of industrial structures), which will have many yields when the right intervention takes place:

- Industrial buildings are built durable. They can live for long periods and are therefore suitable for reuse;
- Constructions are compatible in terms of their form. They allow various uses;
- Constructions have structural features and locations that are appropriate for many sectors. This, in turn, promotes spatial development;
- The structures usually belong large sites, located near water resources and/or transport links. Their advantageous location creates demand for large-scale urban projects.

Approaches ensuring the sustainability of industrial heritage involve opting for functionalities that contribute to urban culture, enhance the quality of urban life and facilitate public use rather than private use. Museums, culture and art centres, university/educational buildings, office and loft housing are the most frequently preferred new functions for industrial buildings. Bankside Power Station (England), Simmering Gasometers (Vienna), Zollverein Coal Mine (Germany) and High Line Rail ways (US) are some successful re-functionalized industrial structure examples from the World.

Figure 1: High Line (Rail ways) – High Line Park (Source: Yılmaz, 2017).

Among these examples, the 2.5 km long High Line is a railway line that is naturally green in some places, with an additional landscape and environmental design, railway line transformed into a pedestrian road. The project where the industrial identity is artfully presented at some points and hidden in some places, has become a generator for the revival of the region by adding life to this region of the city.

Figure 2: İzmir Historic Gas Factory – Culture & Art Centre (Source: Kaya, 2012: 93).

Silahtarağa Power Plant, Lengerhane Building and Hasköy Shipyard, Bomonti Beer Factory, Cer Train Maintenance Hangars, Turkey Pulp and Paper Mill and İzmir Historic Gas Factory are among the re-functionalized examples that can be given from Turkey. Especially İzmir Gas Factory is a successful example with its well-preserved and originally restorated structures.

4. The extinction of an industrial structure and the factor of local authority: Ankara-Maltepe Gas Factory as a case study

In Turkey, during the first decades of the Republic, it is seen that large scale industrial facilities have started to be established in various regions of Anatolia. At the beginning of the 20th century, it is possible to see the industrialization movement in Turkey as a whole planned factory settlement with all the architectural formations (workers' houses, other social areas ...). Until the Republican era, no significant industrial facilities were found in Ankara except for the three flour mills dated between 1890 and 1920. The industrial structures in Ankara, established in fields such as food, energy, railways etc., are mostly built after the declaration of the Republic. Most important one is Ankara-Maltepe Gas Factory.

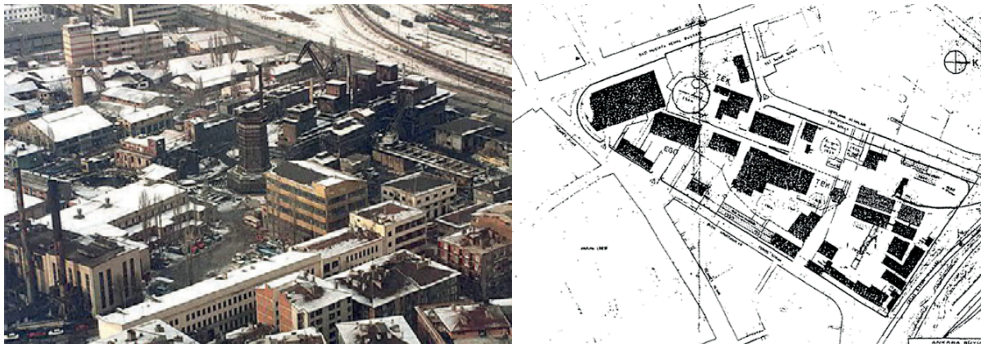

Figure 3: Electric and Gas Factory General View (Source: Goethe-Institut) and Site Plan (Source: Kıraç, 2001: 224).

4.1. The creation of the factory and change-development process

It was thought that the capital Ankara, the face of modernization in the Republican Period, had to be enlightened with modern methods. It was decided to establish an electricity and gas plant in order to eliminate this need. The factory was designed by the architect Werner Issel and built by the German firm Dieder. German, British and Turkish workers worked together for the construction of the factory.

The factory was established in Maltepe, which is defined as the industrial zone in the Ankara's first city plan (1932) that designed by Herman Jansen. It is possible to mention a railway-based industrial settlement. According to the plan; the northern part of the railway is an industrial service area (depot, warehouse, hangar and workshop) and the southern part of the railway is an industrial production area (production unit). The region has developed in this direction.

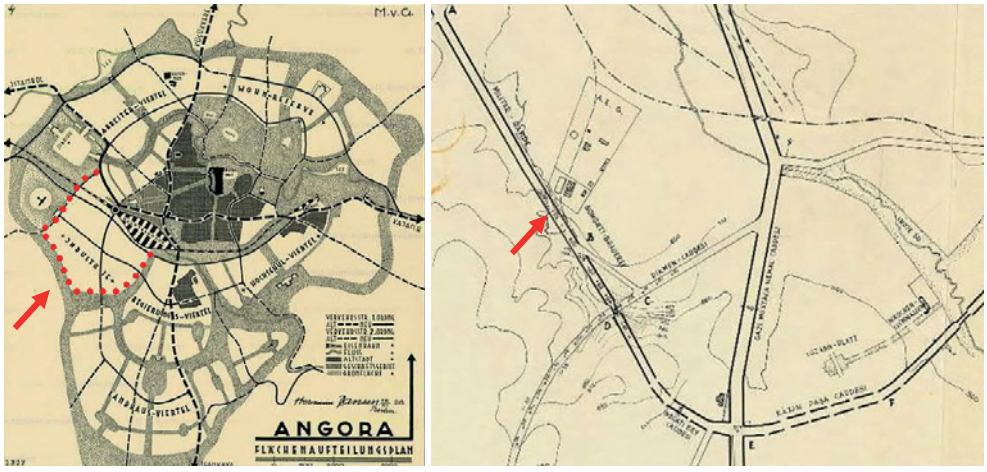

Figure 4: (left) Location of the Industrial Zone of Maltepe in the Jansen Plan (Source: Küreli, 2013 p. 21) and (right) location of the Gas Factory (Source: Küreli, 2013 p. 84).

Growing into a fully-fledged industrial establishment with certain upgrades as well as the addition of service facilities (social areas, lodgings, dining hall etc.) in 1933, Maltepe Electric and Gas Plant is the first electricity-generating plant in Ankara powered with coal gas and coke (TMMOB, 2017). In the area of 52270 m^2, first the electric power plant, building and chimneys (1928), then gas ovens (1929), and oxygen factory as part of the gas factory (1930) was established. The gas factory consists of 4 departments: gas production quarries, gas cleaning and storage facilities, central gas generators for heating furnaces and high pressure compressors. Arguably, the factory largely consists of structures they cannot be categorized as buildings per se, such as furnaces and stoves (Sezgin, 2001: 224).

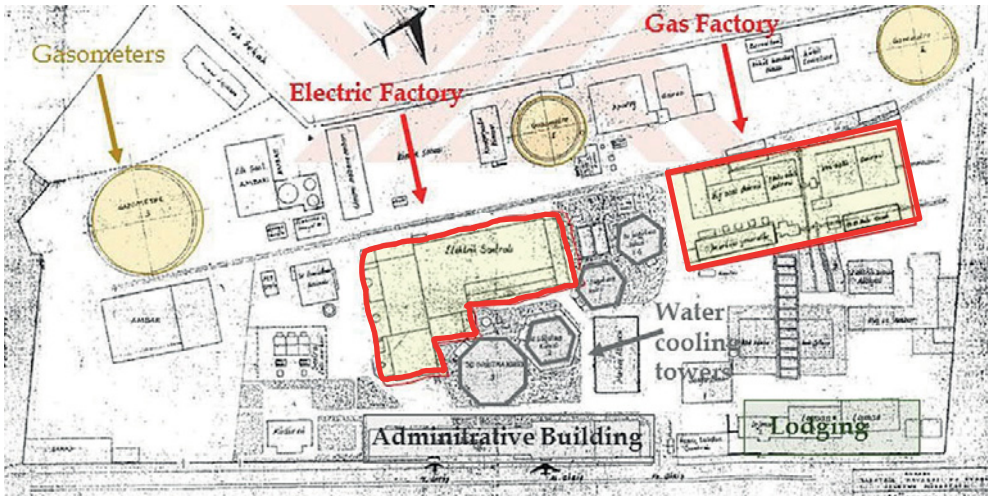

Figure 5: Factory Campus – Departments of Electric and Gas Factory (Source: Kıraç, 2001: 225).

In 1942, Facility was transferred to the Ankara Electricity and Gas Business Administration (EGO) (Sub-organization of Ankara Metropolitan Municipality). According to the new master plan in 1965, some factories in the region have been removed. Same years, due to the increasing population and rapid urbanization, it is reported that the electricity factory will be insufficient in the nearest future. In 1980, electric facility was transferred to the Turkish Electricity Authority (TEK). However, finding it costly to invest, the TEK decided not to embark on new venture (Severcan, 2006). Hence, the operations were completely halted in 1983. In 1990, with the start of the use of natural gas in Ankara, the gas plant has lost its function and stopped the activity (by EGO), too. In the same year, EGO decided to demolish the factory in order to build a business centre. After this date, the factory started to struggle to survive.

4.2. Struggles to protect the natural and cultural heritage of the industrial site

Thanks to the civil resistance campaigns, the Cultural and Natural Heritage Conservation Board of Ankara ruled[2] in 1991 that the factory site and facilities shall be preserved (Saner and Severcan, 2009). This was followed by a legal case where EGO filed an objection against the Board's decision. This court, as far as Turkey is concerned, this is the first known case[3] where the term "industrial archaeology" appeared in official records, with this first use dating 1993 (Saner, 2012: 61).

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2 Decision no 1679 by the Cultural and Natural Heritage Conservation Board of Ankara, dated 19 March 1991.

3 For the judicial decisions during the said process, see the Decision of the Administrative Court of Ankara (Ankara 7. İdare Mahkemesi), No. 1993/19; the Decision of the 6th Chamber of the Council of State (Danıştay 6. Daire), No. 1994/2657 (Saner, 2012: 63).

Figure 6: The Gas Factory, Before the Demolition (Source: TMMOB, 2018).

In the aftermath of the process, the listed factories were surrounded by the annex buildings of EGO and TEDAŞ, while those falling outside the scope of the Board's decision were demolished to break ground for a supermarket. In 1996, pursuant to the final judgment issued in response to the objection by EGO, the Coal-Gas Factory was listed as a legally-protected monument for the sake of supreme public interests. In the following ten years, EGO has made many attempts to cancel the protection order. In 2006, new members of the same authority reversed the previously-adopted conservation decision in violation of the principles of science, law and supreme public interests. Despite the decision by the Council of State, the large part of the structures located in the Coal Gas Factory site were razed to the ground through a nighttime demolition operation by General Directorate of EGO, starting at 19 o'clock on 13 June 2006 (TMMOB, 2017: 2). After a year, the Maltepe Market was relocated to the former factory site, which was thus transformed into a marketplace. Today, the area in question has been further expanded.

Figure 7: Gas Factory Demolition Photos – 2006 (Source: TMMOB, 2017: 3).

Thus, despite all decisions pertaining to registration and conservation, the first industrial structure of Ankara, termed as "industrial archaeology", was utterly destroyed by the authority and decision of the local government. With this demolition, once conceived in harmony

with and as an integral part of Ankara Central Terminal and the vicinity, a document standing as witness to a period of the city's culture now disappeared for good.

4.3. The land use change processes

In the following years, the local authorities' attempts to rezone the area to high-density housing (a floor area ratio of 2.5 in the south and up to 4 in the north) have continued. Thanks to the counterclaims field of NGOs, these initiatives have failed. Nevertheless, despite all the court rulings, in June 2016 the local government still adopted the decision to open up the area to high-density housing (resolution by the Metropolitan Municipality Council). Yet, as it was unlikely for the area to tolerate such a high-density sprawl, the Architecture Branch of the TMMOB (Union of Chambers of Turkish Engineers and Architects, UCTEA) appealed this council resolution which was intended for high-density housing. While the action of nullity was in progress, the annex building of the Electric Power Plant within the premises was demolished in December 2016. In February 2017, the local government began preparations for pulling down the asbestos-containing buildings of the site. In response, the Ankara branch of the Union of Architects organized a press conference with a view to inform the public about the extent of the danger, and subsequently filed a criminal complaint against the local government on grounds that it was planning to start the demolition without informing the citizens and taking the necessary precautions. Still, the Ankara Metropolitan Municipality set out on 25 February 2017 to demolish the building of the Electric Plant containing asbestos.[4]

Figure 8: Demolition of the Power Plant Building which contains asbestos without taking the necessary precautions (Source: TMMOB, 2017: 7).

Much later on, concerning the objection raised against the deletion of the site from the heritage list, it turned out that it had already been concluded on 10 February 2017, with the site once again being listed as a heritage area (Cenikli, 2017). It is impossible to plausibly

[4] Asbestos is a mineral of fibrous nature and the best known insulating material resistant to heat, abrasion and chemical substances. In the second half of the 20th century it was categorized as a carcinogenic substance causing great damage on human health, and thus came to be known as the deadly powder.

explain why and how the local government could carry out the demolition only two weeks after the heritage-listing decision and by concealing such crucial news from the entire public. Thanks to the efforts of NGOs (TMMOB) on March 1, the concerned administrative court issued the decision to halt the demolition process, urging the local and central government to inform the public and place the building under quarantine. However, by the time the factory site was placed under quarantine, as it had to be done in the first place; the demolition had largely been carried out. During the demolition process and removing asbestos-containing material, the entire factory site as well as all places on the route of the truck carrying the contaminated waste were exposed to asbestos release.

Figure 9: Quarantine after the demolition (Source: http://www.mimarlarodasiankara.org/index.php?Did=8704)

Currently there are a total of eight pending cases concerning the Coal Gas Factory, against the Ankara Metropolitan Municipality, Lord Mayor, Director General of EGO and the officials of the company carrying out the demolition. So far, there has been considerable press coverage about the matter, which was also brought to the attention of the Turkish Grand National Assembly, with the Lord Mayor of Ankara being urged to resign. Despite all these debates and charges, the local government contented itself with an official declaration, stating that the demolition took place in the asbestos-free section and there is neither any danger nor a case posing a risk to public health. However, thus far, as of August 2017, according to the expert's examination report (required by the legal proceedings involved), there happened a demolition process contrary to the relevant legislation, without taking the necessary precautions required by the asbestos regulations. In its official press release, Ankara Chamber of Physicians (Ankara Tabip Odası) stated that the following three groups were affected by asbestos exposure on three different levels: The nine workers employed in the demolition operation in the first, the immediate vicinity within a radius of 1 kilometre in the second, and the entire population of Ankara (by way of wind-borne contamination) in the third degree. Further, the Chamber underlined that the workers are very likely to suffer from respiratory problems within the next five years, and ultimately to contract cancer in 10 to 15 years (Cenikli, 2017).

5. Conclusion

The greatest tragedy suffered by industrial buildings is their gradual obsolescence as they lose their functionality due to rapidly-changing technology. This is best illustrated by the former coal gas factories, which fell out of use with the introduction of natural gas, thus facing the threat of annihilation. A similar case was also witnessed in Turkey with the energy-shift of the 1990s. It was again during these years when approaches as well as civil initiatives concerning the preservation of industrial buildings began to blossom, and the terms "industrial heritage" and "industrial archaeology" were brought to the attention of the public for the first time. Embodied in the case for the Ankara Maltepe Gas Factory, these initiatives rest upon the underlying argument that, not only with their scale but also their physical existence and location within the urban fabric, such monumental structures make up an integral part of the collective memory and urban identity.

In this respect, Ankara Maltepe Electric and Gas Plant is a rarely exceptional building with environmental, functional, technical and technological values. It also earned the image of an urban object thanks to the monumental appearance of the non-structural (sculpturesque) industrial artefacts – possessing visual and symbolic values – found within the factory premises. However,

- It was initially this image that was lost due to the demolition all across the factory site, chiefly the destruction of monumental items such as gasometers, gas furnaces and cooling water towers.
- Later on, the remaining artefacts and structures were exposed to wear and decay, mainly because the metal parts were corroded due to lack of maintenance and repair.
- Finally, the factory site was consigned to a fate of oblivion as its immediate vicinity fell victim to settlements devoid of identity.

As has been the case with similar examples, the site covered with dilapidated and abandoned buildings came to create a debris area within the city. With their remains starting to dilapidated, the factory was deliberately brought to a state whereby it was labelled as "dangerous", "likely to imminently collapse" and "ugly", which was then presented to the public as a justification for demolition. Hence, the demolition process was resumed through such "normalization".

The industrial buildings constructed in the past on the said land because of its location as holds several advantageous for the production process which defined formerly. Currently, the industrial buildings became stagnant on the land but as they were the first industrial buildings in the Republic of Turkey, they have a historical meaning that is worth to protect. Originally located outside the city boundaries at the time of their foundation, industrial buildings are in time engulfed in urban expansion due to rapid urbanization, with the vicinity of factories turning into high-rent-yielding construction sites. The land already became an urban land, so it is inevitable to have a building construction on it. Given such circumstances, the factory site comes to be perceived as an obstacle to higher rents. Hence, it was

this "rent-seeking concern" underlying the never-ending insistence of the local government to demolish the Maltepe Coal Gas Factory. From the very beginning, the goal of the local government was to obtain rent on the constructions to be built here. So he supported and even pioneered the constructions to be done. So much so that the local government was willing to build constructions even in natural surroundings due to this rent request. Thus, despite all conservation campaigns and the heritage-listing decision, the outcome (i.e. the pro-demolition attitude on the part of the local government since 1991) was a foregone conclusion. For, the intention has always been the same from the very beginning: Rent-seeking concerns. The initiatives of professional chambers such as TMMOB and the social objections have resulted in some applications being prevented. TMMOB is also working not only to protect but also maintain and sustain the cultural and industrial heritage. For this purpose, TMMOB organized "Maltepe Gas Factory Revaluation – Refunctioning Project – National Idea Contest" between the universities. Projects that are positive about refunctioning have been awarded.

Although this initiative of TMMOB was a very positive endeavour, it had no effect on local administrations. As seen in this particular case, it was the intention on the part of the local government which was the influential and even primary factor in the protection or non-protection of the building or the site. The failure to appreciate and care for the only extant industrial archaeological site of the city not only resulted in the eradication of its cultural values, but also revealed the huge discrepancy and gap between the priorities of local governments on one hand, and modern awareness of urbanization and urban cultural policies on the other. However; the future of industrial facilities that harbour the cultures and experiences of a significant period, should not depend on the intention of the persons or institutions in management as happened in Ankara Maltepe Gas Factory. In order to solve this problem without being left to the *initiative, intention, political goals and decisions of the local government*:

- Ensuring or enhancing the binding of protection and registration decisions of industrial areas legally.
- Introducing conservation obligations for zoning activities in the vicinity of industrial areas.
- The introduction of new, deterrent legal regulations.
- The strict enforcement of all decisions and legal regulations is required.

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Ruşen Keleş*, Ayşegül Mengi*, Tayfun Çınar*

The Endless Land Use Changes in Ankara: The Story of Atatürk Forestry Farm

Abstract

Atatürk Forestry Farm was established in 1925 on the land purchased by Mustafa Kemal Atatürk by his own resources. As a result of the purpose of turning Ankara into a contemporary capital, Atatürk Forestry Farm was planned as a recreation area and as a land for agriculture and husbandry where products were also processed. Atatürk Forestry Farm was donated to the people of Turkey in 1937, one year before Atatürk passed away, with the condition of using the land in line with its establishment purposes. However, after Atatürk passed away, the land of Atatürk Forestry Farm had started to be reduced and opened to the use of public institutions, coal storages, sports centres, factories and housing cooperatives by means of allocation of land, selling, transfer and rent; thus, it was started to be used outside its establishment purposes. In 2006, the planning powers regarding the Farm was given to the Ankara Metropolitan Municipality. Then, the land loss and land use outside its establishment purposes have continued by the insistent planning decisions of the Ankara Metropolitan Municipality. In 2012, the land of Atatürk Forestry Farm has declared as urban transformation and development project area by the Council of Ministers decision and the construction of the Prime Ministry building which would then be turned into Presidential building, called as "Palace", has started. Land loss of Atatürk Forestry Farm has started in 1939 right after Atatürk passed away. During the last 15 years the land was systematically removed from public property and turned into a construction area although it is protected by special legislation.

1. Introduction

On 13 October 1923 Ankara was proclaimed as the capital city of the Republic of Turkey which was going to be established on 29 October 1923. Besides the support given by Ankara to the independence struggle, Ankara as a small district in the middle of Anatolia was selected as the capital city with the purpose of creating totally a new and modern city from the beginning like the creation of a state from zero.

Similar to the selection of the capital city in the centre of Anatolia, establishment of Atatürk Forestry Farm on the most unproductive, swamp and barren land of Ankara had a symbolic meaning. Atatürk Forestry Farm was established in 1925. In 1937, Mustafa Kemal Atatürk purchased the Farm by his own resources one year before he passed away; conditionally donated to the Treasury and thus to the people of Turkey.

* Ankara University, Faculty of Political Science, Ankara/Turkey.

2. The function and importance of Atatürk Forestry Farm

The Farm had various economic, social and cultural functions. On top of all, economically speaking, agricultural production and livestock activities were carried out. Food products were processed and sold to the public with reasonable prices. In addition, socio-culturally, in line with the purpose of serving to the modern citizens of the Republic, the Farm was designed with open spaces, restaurants, swimming pool, theatre, gym and zoo for social gathering, sports, leisure and dining activities (Karakuş Candan, 2017).

Hermann Jansen, who was also planner of Ankara, and Ernst Egli took part in the planning process of the Farm and in the design of the buildings in the Farm.

When the city of Ankara has started to expand, Atatürk Forestry Farm has begun to be located in the city centre and had the function of an air corridor, which would enable the city to breathe.

3. The process of land use change on the land of Atatürk Forestry Farm

Atatürk Forestry Farm was established on an area of 2,000 ha when it was established in 1925. The Farm reached 5,200 ha surface area in 1937 at the time of the donation (METU Faculty of Architecture Atatürk Forestry Farm Researches 2017). The size of the land of the Farm was 10 times larger than Hyde Park in London, and 14 times larger than Central Park in New York (Karakuş Candan 2017). There are different figures regarding the size of the land of the Farm. For instance, in 1950 in a report issued by the High Audit Board, the land was indicated as 9,757.5 ha (Presidency State Supervisory Council, 2003).

The Forestry Farm was first attached to "State Agricultural Enterprises Institution" in 1938 with the name of Gazi Forestry Farm. In 1950, the name of the farm was changed to "Atatürk Forestry Farm" when "Atatürk Forestry Farm Directorate" was founded as a legal entity attached to the Ministry of Agriculture with the Law numbered 5659. According to Law numbered 5659, all property of the Directorate was defined as state property and all crimes against this property was considered as crimes against state property. However, this Law was not able to protect the land of Atatürk Forestry Farm, which was then started to be transferred and sold with enforcement of special laws.

The vast majority of the land of Atatürk Forestry Farm was rented. The most common method was to rent for 49 or 99 years. However, the rented land was not used in line with the Farm's establishment purpose as indicated in the donation letter of Atatürk. Some of this rented land has been used as building land for a hotel, gas station, storage, sports complex, GSM station, and Gazi Military Guesthouse.

It can be said that (Keleş and Mengi, 2014):

- The land of Atatürk Forestry Farm was permitted to be transferred or sold with special legislation.
- The establishment purpose was changed for profit and rent making purposes with methods such as build-operate-transfer. For instance, Ankara Bus Terminal was built

and is now operated by this model in partnership with Ankara Metropolitan Municipality and a private company.

- The land was lost for agricultural production by renting.
- Without any protocol and against existing legislation, the land loss occurred. A cemetery area was designated for a political leader. In addition, the land was rented to bowling saloons and football lands lawlessly without any protocol.

4. Master plan of Atatürk Forestry Farm

Atatürk Forestry Farm which was purchased in 1925 also had a special function in the master plan of Ankara designed by Hermann Jansen in 1928. However, together with the rise of the unplanned urban growth in 1950s and increase of shanty towns, the need to design a new plan had been occurred. The master plan prepared by Yücel-Uybadin defined the land of Atatürk Forestry Farm as uncultivated land and this has increased the construction pressure on the land of the Farm (Karakuş Candan, 2017). In 1990's Ankara Master Plan, air pollution was defined as the most serious urban problem of Ankara. The planning decisions focused on creating a green zone around Ankara and Atatürk Forestry Farm was proposed as the green corridor of the city.

In 2006, with Law for Amending Foundational Law of Atatürk Forestry Farm numbered 5524, the authority for preparing first upper scale plans and development plan for conservation purposes for Atatürk Forestry Farm was given to Ankara Metropolitan Municipality. Ankara Metropolitan Municipality was authorised to use the Farm area for transportation infrastructure such as road and metro construction and for rehabilitation of small rivers. Municipality was also authorised to use the zoo in the Farm for 10 years. In 2012, Council of Ministers declared Zoo Renovation Area within the Farm.

Municipality prepared 1/25'000 scaled Atatürk Forestry Farm Master Development Plan and 1/10'000 scaled Atatürk Forestry Farm Master Development Plan with Conservation Purposes. Such plans were accepted by the Metropolitan Municipal Council in 2007. Since these plans were not prepared in a participatory manner and the planning decisions focused on rent making purposes, legal cases were launched against the decision of the Municipal Council with the demand for annulment of such plans. Given that these plans were not prepared in a participatory approach and as a result of the court cases, these plans were annulled by the Administrative Court in 2008. This annulment also was approved by the Council of State in 2010.

However, in the following period, Ankara Metropolitan Municipality, with an insincere participatory manner, developed and implemented new plans which imposed similar planning decisions.

In the meantime, in 1992 Atatürk Forestry Farm was declared as 1st Degree Natural and Historical Site Area. This meant that no construction work is permitted in the land of the Farm and existing structure is not allowed to be changed. However, in 2011 land of the

Farm was decreased to 3rd Degree Natural Site Area by the annulment of its "historical site" status (Keleş and Mengi, 2014).

In 2012, the land of Atatürk Forestry Farm has declared as urban transformation and development project area by the Council of Ministers decision. Following this decision, the construction of the Prime Ministry building, which would then be turned into Presidential building and be called as "Palace", has started against the decision of the Administrative Court with the support of the former Prime Minister – the current President. In parallel, a mosque and service buildings were also constructed as annexes to the main building. It has become to be considered as an Islamic-Ottoman social complex, "külliye", by the political power. Today, the land use continues to be expanded.

The land use change can be considered as a reflection of the interference of the political power to space with the aim of creating its own values by eliminating the heritage of Mustafa Kemal Atatürk and the independent, secular and democratic Republic and its values. In parallel, the area has started to be named as Beştepe instead of Atatürk Forestry Farm which can be also considered as a reflection of this situation.

5. Conclusion

After 1938, when Atatürk passed away, the land loss of Atatürk Forestry Farm continuously accelerated. The first land was sold following nine months after Atatürk passed away.

There is common responsibility of central government, local government and citizens in the land use changes in Atatürk Forestry Farm since 1938, which accelerated during the last 15 years. The continuous land loss can be seen as a result of conservative Islamic policies implemented by the political power, which transferred public land and natural areas into economic and private use by heavy construction as a result of neo-liberal policies. This has increased the pressure on the land of the Farm, which has started to be used outside its establishment purpose by opening the land to the use of public institutions as well as to private use. In parallel to the expansion of Ankara towards west, Atatürk Forestry Farm was located in the middle of the city and the land has become more valuable and attractive for the political power. This resulted in construction work in the land of the Farm and increased the focus only on its economic value instead of its usage and life value, which resulted in using the land outside its establishment purpose.

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Ayşegül Mengi*, Deniz İşçioğlu**

Reflection of Mega Projects on Land Use: Third Airport Project in Istanbul

Abstract

Mega projects are large-scale, high-cost projects that are governed and directed by the government. They are affecting the economic, social and ecological structures of urban areas. In Turkey, there are very serious challenges in the realisation of the mega projects based on the build-operate-transfer models within the framework of public-private cooperation. Besides, the high financial risks, favouring sealed and uncontrolled tender processes that do not protect the public interests and location selection and planning decisions endangering the natural and cultural assets are the primary ones among these negativities.

1. Introduction

The biggest mega-projects in Turkey in recent years are the 3rd Airport for Istanbul, the 3rd Bridge for Istanbul, the Canal Istanbul, the Eurasia Tunnel and the Gebze-Izmir Motorway. The biggest three of these projects are located in Istanbul: The 3rd Airport, the 3rd Bridge and the Canal Istanbul are located within the borders of the Northern forests of Istanbul and are designed as projects that feed each other. The land value increase caused by these projects in the region will necessitate to consider on mega projects both in terms of Istanbul city and Turkey.

There are two international airports in Istanbul. These are Atatürk Airport built in 1924 and Sabiha Gökçen Airport built in 2001. Total passenger transportation capacity of the two airports is approximately 115 million annually (EIA Report, 2013). It is claimed that the 3rd Airport, the construction of which was started in Istanbul, will be one of the biggest airports in the world with an annual capacity of 150 million passengers. Whether Istanbul needs such a big airport is a matter of debate.

The role of airports in the development of mega-cities is very important. Accordingly, airports are now not only transportation centres but also centres including business and commerce functions in metropolitan areas. Thus, it is obvious that the aim is using precious lands of Istanbul to keep the Turkish economy alive, which is not producing and predominantly based on the construction sector.

* Ankara University, Faculty of Political Science, Ankara/Turkey.

** Eastern Mediterranean University, Faculty of Business and Economics, N. Cyprus/Turkey.

2. Mega projects and land use decisions in Turkey

It is known that for the last fifteen years Turkish economy is based on the construction and real estate sector. One of the most important reasons for this is the unearned income from the land. In this period, the construction sector has come into prominence as a result of the opening of publicly owned lands for the investment of national and international capital. Istanbul is the most important metropolis of Turkey in economic, social and cultural terms, and Istanbul contributes the largest share to the GDP in Turkey. Again, the historical, cultural and natural values it possesses and the high profit that can be gained by converting these values into money, make Istanbul the leading actor of the Turkish economy. For this reason, it is planned that Mega Projects participated by national and international capital, such as 3rd Bridge, 3rd Airport and Canal Istanbul, shall be constructed in Istanbul.

3rd Bridge, 3rd Airport and Canal Istanbul Projects are three package projects that complement each other. These three projects are actually aimed at creating a new urban complex. Near the 3rd Airport a city with approximately 2–3 million population shall be established; and it is planned to provide access to this new urban complex to be established via 3rd Bridge, Northern Marmara Highway and Canal Istanbul to be built in Bosporus. The three projects that will be carried out with the Build-Operate-Transfer method are located in the north of Istanbul, in the region where there are forest areas, water basins, wetlands and agricultural lands. These are the areas to be protected by the government and they are under the sovereignty and discretion of the government. For example, the areas under the sovereignty and discretion of the government under the 3rd Airport Project constitute 77.58% of the project area (EIA Report, 2013). The remaining part is privately owned.

Although it has not been announced for a long time where the 3rd Airport will be constructed, it has been revealed that many companies in the project area have purchased a large amount of land long before the announcement of the 3rd Airport Project. In any case, the fact that the size of the area, where the 3rd airport will be constructed, is much larger than needed, reminds that the lands for 3rd Airport can be opened to construction and real estate activities for unearned income by members of the Consortium, who gets the tender and owns construction companies.

3. Third airport project for Istanbul

The name of the project is Istanbul Region 3rd Airport Project and the owner (responsible for the administrative procedures) of the Project is the General Directorate of Infrastructure Investments of the Ministry of Transport, Maritime Affairs and Communications. The size of the total project area is 7,650 hectares (EIA Report, 2013). The project area covers a land about 7.5 kilometres long and 10 kilometres wide in the north of Istanbul. The land use forms of the project area give important clues about the economic and ecological impacts of the 3rd Airport Project. 6,172 hectares of the project area are forests, 1,180 hectares are for mining, 660 hectares are the lake area, 236 hectares are pasture, 60 hectares are dry farming (non-fallowing) area, 2 hectares are heaths area and 189,182 hectares of the total project

area is the private property (EIA Report, 2013). There are also military prohibited zones in the project area under the sovereignty and discretion of the government.

Atlanta Airport (USA) has been constructed on an area of 1,625 hectares with 95 million passengers per year. If a simple proportion is established with a mathematical calculation, it can be concluded that 3,500 hectares of space shall be sufficient for Istanbul 3rd Airport, which is planned to be 1.5 times the size of the world's busiest airport, Atlanta Airport (USA). Then the crucial question is, for what purpose, the rest of the 7,650 hectares of land designated for the 3rd Airport will be used (Northern Forests Defence, 2015).

In the context of the project, it is planned to build in fact a city in the form of an Airport City Complex, consisting of sport centres, museums and exhibition halls, conference centres, cultural centres, business centres, mosques, churches, synagogues, hospitals and in addition trade areas that have to be included in an airport (Northern Forests Defence, 2015).

Chronologically the project was put on the agenda in October 2010. The location of the 3rd Airport was concealed in great confidentiality first and then announced in May 2012 by the Government that it would be built in the area called "The European Side of the Black Sea". In March 2013, the Environmental Impact Assessment (EIA) process began. The tender was held on May 3, 2013 before the delivery date of the EIA report was completed. The Ministry of Environment and Urban Planning gave a positive report on EIA to the project on 21 May 2013; a new EIA report was prepared while the judicial process was pending, despite the motion of 4th Administrative Court of Istanbul on April 21, 2014 to stay the execution. Meanwhile, in May 2013, the construction tender for the airport was carried out, and the quinary consortium including Cengiz-Kolin-Limak-MAPA-Kalyon got the tender. The person responsible for designing the project architecture is British national Gudmund Stokke, who is the member of Grimshaw Architects, Haptic Architech, Arup Associates and Nordic Office (NO) architect consortium as well as founder and CEO of NO.

On June 7, 2014, the ground-breaking ceremony of the 3rd Airport was held before the planning process and judicial process were completed. Today the construction of the airport continues rapidly and by the end of August 2017, 57% of it was completed. On the other hand, 1/100000 scaled landscaping plan, 1/5000 scaled master plan and 1/1000 scaled application development plan prepared for the project have been announced, only one year later, on June 17, 2014. The lands in private property in the project area is going to be expropriated by reaching an agreement with the holders of the property rights. The Housing Development Administration of Turkey proposed a deal to the landowners for a certain price but the residents of the region objected because the expropriation prices were much lower than expected. Land owners stated that the expropriation prices were very low compared to their equals and "Housing Authority" (TOKİ–Toplu Konut İdaresi) had proposed between 22 TL and 35 TL per square meter and defended that the square meter of the equal lands in the same region could have a market from 300 TL to 500 TL.

When TOKİ could not solve this problem with the land owners, the Council of Ministers, considering that the expropriations did not work, decided in January 2014 to rapid

expropriation of the real estates located within the Istanbul 3rd Airport area. The rapid expropriation decision, which is regulated in article 27 of the Expropriation Law and can only be taken in emergency situations, such as war and disaster, is a very common method recently used for urban transformation projects and energy investments. This method predicts that the assessment procedures of real estates should be carried out after all the property is seized.

4. Economic effects of the project

On one hand, infrastructural projects carried out through Build-Operate-Transfer and Build-Operate methods do not remove the burden on the government, on the contrary, it causes the obligations of the government to spread to the long term, the costs increase accordingly and the citizens pay high service fees for the services provided (Sönmez, 2016). Again, due to the Treasury guarantee on contracts for investments made through the public-private partnership model, investments made under this model create conditional contingency for the future and allow the foreign debts of the private sector to be undertaken by the Treasury in certain circumstances (Sönmez, 2016).

On the other hand, as in the case of other public-private cooperation models, the tariff and income guarantee have been given to the Consortium, which awarded the tender in the specifications of the 3rd Airport Project. For example, the government has guaranteed to pay 20 euros per person until the contractor gains 6.3 billion euros in 12 years. It is also stated that Atatürk Airport, which is currently serving in this area, is guaranteed to be closed to scheduled flights after the project is completed (http://gazeteport.com/2015/ataturk-havaalani-imara-mi-acilacak-5383/).

Non-supervision of a huge project, which could have serious effects on the economy of the country, such as the 3rd Airport, by the Turkish Grand National Assembly and their non-transparent cost analyses are encountered as important problems (Sönmez, 2016).

The most important effect of the 3rd Airport Project, apart from its cost to the public sector, is the land rent that emerges in the region where the Project is constructed. After the tender is granted, collective land purchases in the 3rd Bridge and the 3rd Airport area draw attention. Construction companies have begun to design luxury housing projects. It is reported by the official authorities that after the determination of the location of the 3rd Airport , land prices in the region increased by 22% during the period 2010–2011 and 59% within the years 2011 and 2012 (http://www.diken.com.tr/9-soruda-ucuncu-havalimani-projesi/). The total amount of land purchased and passed into other hands at a very low price from the villagers in the region, how many times the lands have passed into other hands and who are the persons, organizations, companies, media organizations or firms that are the real buyers of the lands are not known.

5. Ecological effects of the project

In addition to the economic effects, the project has also significant ecological effects. As mentioned earlier, most of the project area is covered by forest, pasture area, farmland,

wetlands, lakes and ponds (EIA Report, 2013). The property of these areas belongs to the government and they are the areas required to be protected. It is predicted by the experts and scientists that the 3rd Airport Project will damage the water basins, wetlands, flora and fauna in the region, prevent the migration of birds and endanger the flight security during migrations since it would be constructed in the migration routes of the birds. In addition, the climate change that is thought to be experienced in the framework of the project is also a very important ecological effect (Tolunay, 2015).

The forest area in the project area should not be considered as a forest area constituting only of trees. The forests should be considered together with countless living species in them. Destruction of lakes, ponds and lagoons in the project area means that these areas will lose their wetland character (EIA Report, 2013). This is contrary to the constitution and the laws as well as to the international agreement that Turkey is a party for the protection of wetlands. The pollution expected to mix with the rivers supplying water to the dams that meet a significant part of Istanbul's drinking water needs will also be subject to carriage to the dams with these rivers (EIA Report, 2013). Endemic in the project area, there is also the possibility of plant species that are unique to that region to be destroyed. In fact, the consecutive heavy rains and floods experienced as a result of these rains in Istanbul this year (2017) shows the accuracy of the predictions and that not much more time will elapse for experiencing the negative consequences of the project.

6. Conclusion

When the project is completed, almost 90% of this area will be sealed. Most of the forests, pastures, agricultural lands and wetlands in the area will be destroyed. Although the Istanbul Landscaping Plan specifies that the natural thresholds of Istanbul will be enough for 16 million people, it is predicted in accordance with most optimistic estimations that the population of the city will exceed 20 million with the Mega Projects, which are planned to be built in addition to the airport. In this case, it is obvious that Istanbul will not be able to provide healthy and sustainable living conditions.

The 3rd Airport Project planned for Istanbul is very important not only for Istanbul but also for Turkey as it will create negative economic and ecological consequences. It can be said that this project is an environmental crime.

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Maruška Šubic Kovač*

Acquisition of Land and Compensation in Infrastructure Projects in the Republic of Slovenia

Abstract

Land acquisition process for construction in the public interest, including the construction of infrastructure, is in Slovenia linked to the constitutionally guaranteed private property. Though the expropriation constitutes a last possible option (ultima ratio), particularly at land acquisition for construction of infrastructure, there still exist relatively many such procedures in Slovenia. In this context, answers to two research questions are sought in this article: (1) To what extent do the existing procedures of land acquisition for construction of infrastructure for the public benefit suffice for the timely acquisition of land for construction? (2) What are the essential causes of inadequate valuation or compensation determination of land to be acquired for construction of infrastructure for the public benefit? Though in the recent twenty years the legislation governing land acquisition for construction in the public interest has been amended several times, these amendments have not substantially impacted the procedures in practice. In addition to the normal expropriation procedure, the so-called "actual expropriation" is applied in this respect, where the State or Municipality divests the owner of property right without implementing the formal expropriation procedure. Numerous cases, where public roads cross privately-owned land, should be resolved by a special law. Numerous deficiencies in real estate valuations in relevant procedures were found. As the dissatisfaction of real estate owners with the levels of compensation affects the timely land acquisition for construction, the field of individual real estate valuation should be regulated as a whole, taking into account the objective circumstances in the field of real estate in Slovenia.

1. Introduction

Infrastructure projects are a most burning topic in Slovenia. From independence of Slovenia of 1991 and up to the present, many projects have been misguided. The most problematic ones include (24 ur 2015):

- In transport infrastructure, poor financial evaluations for implementation of highway programme, poor supervision, corruption, and non-compliance with the time schedule of construction;
- Construction of facilities for processing of municipal waste was planned at State level in excessive quantity and over-dimensioned, as it was not taken into account that the

* University of Ljubljana, Faculty of Civil and Geodetic Engineering, Municipal Economics Institute, Ljubljana/Slovenia.

quantity of waste, on account of waste segregation, waste recycling and reuse, would gradually be decreasing.

The State should have learned from these errors, and prevent irrational use of budget funds. For the new planning and budget period up to 2020, Slovenia prepared 22 infrastructure projects, and in order to implement these projects, new building land will need to be acquired. However, land acquisition for infrastructure projects is frequently linked with problems in Slovenia, as the relevant procedures are based on general principles of protection of private property right (Stockbauer, Zagorac and Vlačič, 2014), which is constitutionally guaranteed in the Republic of Slovenia only from 1991.

Under the circumstances of constitutionally guaranteed private property, the advantage is in the consensual, contractual land acquisition for construction in the public interest, and expropriation constitutes a last possible option (ultima ratio) if the land cannot be acquired by voluntary sale. Nevertheless, particularly at land acquisition for construction of infrastructure, there still exist relatively many such procedures, in particular in case of civil engineering works, where the location cannot be selected in the same way as for buildings.

In this respect, answers to two research questions are sought:

- To what extent do existing procedures of land acquisition for construction of infrastructure for the public benefit suffice for the timely acquisition of land for construction?
- What are the essential causes of inadequate valuation or compensation determination of land to be acquired for construction of infrastructure for the public benefit?

In seeking answers to these two questions, the content of this article is divided into three chapters:

- firstly, analysis of situation in land acquisition for construction of infrastructure in the public interest in Slovenia;
- secondly, analysis of real estate valuation in these cases, and in particular, the determination of compensations of former owners; analysis of case-law in determination of compensations, and analysis of real estate reports in the procedure of land acquisition for construction of infrastructure; and
- thirdly, analysis of initial endeavours of regulation of individual real estate valuation in Slovenia.

2. Analysis of situation at land acquisition for construction for public benefit in Slovenia

To construct infrastructure for public benefit it is necessary to ensure the necessary size of land for construction in good time, at appropriate price and at an appropriate site. Land acquisition for construction takes place between the consensual and forced acquisition of property right on such land.

Legal regulation of this particular area is extremely fragmentary in Slovenia, and governed by many different laws. Most important is the Constitution of the Republic of Slovenia / Ustava Republike Slovenije (1991). The Constitution guarantees the right to private property; it lays down that expropriation shall be executed for the public benefit, based on law, and against payment of compensation/indemnification, or compensation in kind. Public benefit shall be in proportion to the gravity of encroachment upon property right, and encroachment shall be indispensable and solely for construction of facilities laid down by law.

The fundamental law governing land acquisition for construction and determination of compensations is the Spatial Management Act / Zakon o urejanju naselij, which was adopted in 2002 and was in force by 2017 (hereinafter referred to as: the Act of 2002), and was applicable at local level. The most essential shortcomings of this Act include: (1) The expropriated person (owner) is not guaranteed an appropriate compensation for real estate expropriated, in the shortest possible time, and his/her rights are not protected. (2) It does not enable (the State and) the Municipality to obtain property right on property within a shortest possible time so as to facilitate the realisation of public benefit.

There are also other sectoral laws, which are used in a subsidiary manner. The most important thereof is the Siting of Spatial Arrangements of National Importance Act / Zakon o umeščanju prostorskih ureditev državnega pomena v prostor, which was adopted in 2010 and was in force by 2017 (hereinafter referred to as: the Act of 2010), and governed the expropriation procedure and compensation determination at national level, and in particular, it rectified the errors of the Act of 2002 in this field. Other relevant laws include the Act Regulating Specific Issues Dealing with the Construction of the Motorways Network in the Republic of Slovenia; the Roads Act; the Energy Act; and others.

At present (by 2017), there are two procedures of land acquisition for construction for public benefit, and two methods of compensation determination in Slovenia: one applies at the local level, and the other at the national level. For this reason, and due to other shortcomings of the existing legislation, the need emerged for a new law in this field. The new law should institute a less complex and most transparent procedure of expropriation and compensation determination. There are diametrically opposed understandings and expectations of real estate value between owners and investors, which result in numerous disputes, the procedures are prolonged and more costly. The new law should abolish these shortcomings.

At the time of preparation of this article, a new Spatial Management Act / Zakon o urejanju prostora (hereinafter referred to as: the Act of 2017) was adopted on 24.10.2017. The Act is in force as from 17.11.2017 and will be applicable as from 1.6.2018 (*vacatio legis*). For this reason, the new Act will be included in the analysis hereinafter, where appropriate.

2.1. Differences in expropriation procedure under the Act of 2002, the Act of 2010 and the Act of 2017

Based on analysis of differences under the Act of 2002, the Act of 2010, and the Act of 2017, the development in expropriation procedure in the Republic of Slovenia can be

analysed. Table 1 shows the collective comparative significant elements in the expropriation procedure under the respective Acts.

Expropriation beneficiaries under the law in the Republic of Slovenia are the State and the Municipality.

The Acts of 2002, 2010 and 2017 lay down that the investor shall first, by registered letter, serve the proprietor a real estate acquisition offer, and a contract to be made in place of expropriation. Should the contract not be made within 30 days, the expropriation beneficiary may lodge an expropriation proposal with the relevant Administrative Unit.

According to the Act of 2002, the procedure shall be instituted by issuing a Decision, with a possibility of appeal against the Decision, whilst according to the Act of 2010 and the Act of 2017, based on the Ruling opening the expropriation procedure, no such appeal is possible.

Under the Act of 2002, public benefit is defined by the type of real estate (economic public infrastructure, national defence facilities, national reserves, safety of citizens and their property, protection against natural and other disasters, social infrastructure facilities, construction of non-profit and social apartments) and/or by the type of real estate, and by an additional Government's/Municipal Council's verification of public benefit of the real estate. Under the Act of 2010, the range of type of construction is expanded. In addition to objectives of the Act of 2002, the objectives include also the purposes/measures according to the nature conservation regulations, where such measures are required for spatial management implementation and are envisaged in relevant plans. Public benefit according to the Act of 2017 is defined by the type of real estate, which includes the type of real estate according to the Acts of 2002 and 2010, but is linked to the demonstrated accuracy of the relevant real estate. Public benefit is demonstrated if the relevant real estate is defined in the spatial implementing acts so accurately that it can graphically be presented in the land cadastre, or that an integral permit has been granted for such real estate (replacing a building permit in specific cases) (Article 103 of the Act of 2017). In case that this is not determined so accurately, the Government or the Municipal Council may specifically establish the urgency of procedure for public benefit of construction. According to certain sources, the expropriation procedures should be shortened. Question is, how private property will be protected in such cases.

The Act of 2002 requires the double identification and weighting of public benefit against private interests (prior to issuing of Decision instituting the expropriation, and prior to the Ruling opening the expropriation procedure), whilst the Act of 2010 and the Act of 2017 lay down that the Administrative Authority does not ascertain the existence of public benefit anymore, and neither does it institute a specific ascertainment procedure, but only examines the formal prerequisites for instituting the expropriation procedure (timeliness, intelligibility and completeness of request). Certain sources assert that expropriation procedures should be shortened. Question is, whether the procedure will in fact be shortened, and how will private property be protected in such cases.

Table 1: Comparison of individual elements in expropriation procedure according to relevant laws governing expropriation in the Republic of Slovenia

Act of 2002 (in force by 2017)	Act of 2010 (in force by 2017)	Act of 2017 (in force from 2017)*
Expropriation beneficiary		
Municipality	State	State/Municipality
Instituting of expropriation		
Decision instituting the expropriation (possibility of appeal against the Decision).	Ruling opening the expropriation procedure (no possibility of appeal against the Decree).	Ruling opening the expropriation procedure (no possibility of appeal against the Decree).
Public benefit		
Public benefit id determined by the type of real estate and/or the type of real estate and additional verification by the Government or by the Municipal Council.	In addition to objectives of the Act of 2002, the objectives include also the purposes/ measures according to the nature conservation regulations, where such measures are required for spatial management implementation and are envisaged in relevant plans.	Public benefit is determined by the type of construction, which includes the type of construction according to the Acts of 2002 and 2010, and is linked to its demonstrated accuracy.
Identifying of public benefit		
Double public benefit ascertainment procedure (prior to issuing of Decision instituting the expropriation, and prior to the Ruling opening the expropriation procedure).	No public benefit ascertainment procedure; only formal prerequisites for instituting the expropriation procedure are examined (timeliness, intelligibility and completeness of request).	No public benefit ascertainment procedure; only formal prerequisites for instituting the expropriation procedure are examined (timeliness, intelligibility and completeness of request).
Urgency of procedure		
Possibility of urgent expropriation procedure if the real estate needs to be acquired rapidly, but on reasoned grounds.	Procedure may be presented as urgent also if the required conditions of the Act of 2002 are complied with, and the advance payment of one half of the assessed compensation has been paid.	Urgency of procedure is determined by conditions according to the Act of 2002, and the Act of 2010.
Costs of procedure		
The law does not govern the costs of procedure.	Eligible costs of procedure only are to be covered by the State.	Eligible costs of procedure only are to be covered by the State or by the Municipality.

* The Act entered into force on 17.11.2017, and shall be applicable as from 1.6.2018.

The Act of 2002 envisages the shortened – urgent procedure, which is contestable, as it is rather difficult to substantiate the urgency of the procedure (owing to the subjective justification by the Administrative Unit), and additionally, this is only a priority for the processing of the request, which does not contribute in any way to decreasing the length of the procedure. The procedure is questionable as the urgency is determined by the Administrative Unit, and only the priority treatment is decided on, whilst the provisions on the time of payment of compensation remain the same as under the regular procedure. The Act of 2010 and the Act of 2017 envisage the implementation of procedure with a preliminary part payment of compensation and caution money for a possible damage, at the level of one half of compensation, whereby the condition for assuming the possession of expropriated real estate has been complied with. To this end, the urgency of procedure does not need to be demonstrated.

The Act of 2002 does not govern any costs incurred by the expropriation procedure. Real estate owners used to require different damage compensations at the courts, which were not reasonable and thus unjustified (Judgement Case by the Supreme Court of the Republic of Slovenia, Ruling I Up 97/2008). The Act of 2010 and the Act of 2017 lay down that the eligible costs of expropriation procedure, which closes with expropriation, shall be borne by the State or the Municipality (the expropriation beneficiary). Such costs do not cover any costs incurred by the use of legal means available to the expropriation beneficiary.

According to the Slovenian legal order, the owner may act against the decisions of Administrative Authorities by launching an administrative dispute. Against a Ruling of the first instance, there exists the possibility of filing a complaint and/or a revision of procedure.

Comparison of the relevant laws (Table 1) shows that the new Act of 2017 did not bring any essential changes to the field of land acquisition for public benefit, as only certain material provisions were updated. However, it is important that the Act uniformly deals with the procedure of expropriation and compensation determination in the Republic of Slovenia, which constitutes the necessary, but not the sufficient condition, for decreasing the conflicting situations in implementing the infrastructure projects.

2.2. "Actual expropriation" and inverted expropriation procedure

In addition to the normal, legally defined expropriations, Slovenia has in place the so-called "actual expropriations", where the State or Municipality divests the owner of property right without implementing the formal expropriation procedure. Most cases constitute public roads, running along someone else's land (Šubic Kovač and Rakar, 2010). This is the so-called "inverted expropriation procedure", where the property right is withdrawn first, and thereafter, the procedure of land acquisition based on expropriation procedure is implemented. As found by the Constitutional Court, such a procedure is unconstitutional and unlawful (as ruled for instance by the Constitutional Court in one of its numerous rulings: Ruling U-I-161/15).

The opinion of the European Court of Human Rights is that in such cases the right to private property is violated. Municipalities classified as public roads also the roads running along someone else's land. Such cases are not infrequent in Slovenia. It was estimated that only the Ljubljana Municipality should in future acquire property right on approximately 200 hectares of land, with approximately 7,900 land plots, where now public roads are running along someone else's land (Šubic Kovač and Rakar, 2010).

For this reason, the Constitutional Court found that legal regulations governing the classification of public roads running along someone else's land were unconstitutional and unlawful. Municipalities have been required by the Constitutional Court of the Republic of Slovenia to implement the expropriation procedures subsequently, or implement the procedures of abolishment of public roads according to the applicable law. The Human Rights Ombudsman, and the Ministry of Infrastructure, which had as early as in 2014 imposed sanctions on Municipalities (Act on Local Self-Administration of 2007), laying down that the Municipality Council shall prematurely be dissolved, and the Mayer prematurely acquitted of his service in cases, where the Municipalities fail to implement the provisions by the Constitutional Court, and fail to acquire the relevant land for public roads.

In most cases, Municipalities do not have sufficient funds to purchase the land, to provide for the allotment and regulation of geodesic data on plots of land in the land cadastre, and for this reason, the National Council of the Republic of Slovenia prepared a draft law regulating the ownership of public roads (published on 11.10.2017), which should actively contribute to the regulation of such problems.

Individual cases in Municipalities (for instance, the Judgement by the Supreme Court of the Republic of Slovenia, Ruling II DoR 212/2013) show that land owners have irrationally high requirements concerning compensations, and for this reason, the draft law specifically highlights that the level of all compensations to all the beneficiaries together is limited and that its total shall at the most reach the value of the relevant real estate. As the value of relevant real estate shall be considered the value of real estate achieved without the object of the public road and without other public infrastructure objects, i.e. the value of real estate in condition prior to public road construction.

The draft law lays down also that the owner entered in the land register shall not be entitled to service-fee payment on account of use of real estate as a public road. The draft law movers explain this by the fact that roads are goods in general use and that it is not appropriate that the land owner entered in the land register, who had neither opposed to the use nor required a compensation, would now be in a position to require payment of service-fee in retrograde, which had already been established by the European Court of Human Rights in the Guiso-Gallisay Case versus Italy of 22.12.2009.

Unfortunately, this was only an initial attempt at resolving this burning problem in the Republic of Slovenia, and it was rejected on account of unequal treatment of land owners.

3. Analysis of compensation determination

According to the law (the Act of 2002 and the Act of 2017), the fundamental compensation shall be monetary; subordinated to this compensation shall be the compensation in kind. Hereinafter, we will focus on monetary compensation.

Compensation shall enable the affected owner to establish a property situation that is equal to the one prior to expropriation (Judgement by the Supreme Court of the Republic of Slovenia, Ruling II IpS 262/2012). In addition, there shall apply the principle that equality shall exist between a person, who has been expropriated, and another person, who has not been expropriated. This means that compensation shall be appropriate for the owner and for the State and Municipality.

According to the Constitution, this is a full compensation, which shall consist of two parts: compensation for the right expropriated, and compensation for the collateral damage.

Compensation shall enable the owner to acquire on the market an object of the same type and value as the one expropriated. Compensation shall be defined as a sum of value of real estate in consideration of its actual use, and of costs or expenses linked to expropriation (including: movement costs, lost profit during the time of movement, and a decrease in value of the remaining real estate). According to the case-law, this value is the market value of real estate at the time of payment of compensation and/or at the beginning of expropriation procedure.

The Act of 2017 is somewhat more specific concerning the costs or expenses linked to expropriation. These costs are called the "compensation for damage, and other costs linked to expropriation" and are detailed in Article 206 (3). The Act of 2017 envisages the legislative regulation of the methodology of real estate value assessment, of damages on real estate, and of other costs incurred for the purpose of instituting spatial regulation of national significance (Article 295).

3.1. Analysis of case-law governing compensation determination

The few provisions of the Act of 2002 concerning the determination of compensation in case of expropriation have led to numerous complaints regarding the compensations determined. There exist the diametrically opposed understandings and expectations of real estate value between owners and investors, which result in numerous disputes, the procedures are prolonged and more costly. Approximately 50% of real estate owners do not agree with the estimated real estate value, and for this reason, the compensation determination procedure is turned over to the court, whereby the beginning of project implementation is delayed (Working group for Spatial Solutions, Directorate for Spatial Planning within the Ministry of the Environment and Spatial Planning, Government of the Republic of Slovenia, 2013). Additionally, on account of a fixed deadline for the commencement of construction of infrastructure, the State or the Municipality is forced to acquire the land in consensus at rather a higher price, as in the opposite case the expropriation procedure prolongs the entire process.

Most frequent complaints refer to:

- Determination of legal status of land (for instance, the Judgement by the Higher Court of the Republic of Slovenia, VSL, Ruling II Cp 1441/2014)

The Supreme Court decided in all these cases that in assessing the value of real estate, the destination of land prior to the enforcement of Spatial Act, which constitutes the basis for expropriation, should be taken into account. It is important, how much money would the owner of real estate obtain on the market if the expropriation and Spatial Act, constituting the basis of expropriation, did not take place.

- Determination of compensation in case of the so-called "actual expropriation" (for instance, the Decision by the Constitutional Court of the Republic of Slovenia, Decision U-I-161/15, 2015)

In such cases, the Supreme Court urged the State and Municipality to implement a lawful expropriation procedure, where the gravity of inflicted unlawfulness would need to be properly evaluated. In such a case, appropriate compensation would be equal to land market value at the time of expropriation, increased by the level of inflation in the period from expropriation up to payment of compensation, including the interest laid down for use of foreign money (European Court of Human Rights, Grand Chamber 2009). It is interesting that formerly the European Court of Human Rights considered as appropriate compensation a sum of market value, increased by value of construction object (road), constructed by the State or local community on such land.

- Decrease of value of remaining real estate, as a result of expropriation, and damage, which does not result from expropriation, but is a consequence of the project (for instance, the Judgement by the Higher Court of the Republic of Slovenia, VSL, Ruling I Cp 2870/2013)

It needs to be differentiated between the impact of expropriation and the impact of the project, which results from expropriation. The Supreme Court decided that the aggrieved party may be entitled to compensation of damage, which results from the project that followed the expropriation, according to provisions of the Code of Obligations only, and not according to the Act of 2002, which governs the expropriation.

- Level of compensation (own experiences in acting as the valuation report reviewer)

Owner is dissatisfied with real estate valuation, and requires the valuation to be carried out by a different appraiser. This is more and more the case more recently. The owner fails to substantiate his opinion by concrete evidence, and the Supreme Court denies his appeal. In general, the owners indicate rather too generally, that the valuation report: "has not been drawn up according to the rules of profession and science", or "not been drawn up according to the international standards" which, in my opinion, shows in particular that the owners themselves are dissatisfied with the level of compensation.

3.2. Analysis of valuation reports in the procedure of land acquisition for construction of infrastructure

In procedures of land acquisition for construction of infrastructure, the assessment of real estate is problematic as well. The current regulation of individual real estate value assessment is governed by numerous laws, which leads to unequal treatment of owners and to differing valuations by individual real estate appraisers, and thereby, to a greater number of expropriations and conflicts in implementing legal regulations.

In 2014, the Court of Auditors published a report on the assessment of compensation determination on account of construction and reconstruction of public infrastructure (Court of Auditors of the Republic of Slovenia, 2014). The assessment is based on a supposition that compensations cannot be profitable. This means that the owner and the State and Municipality need to behave as good householders. Likewise, there cannot exist too big differences between compensations for comparable real estate units.

The Court of Auditors found that the valuation reports analysed, concerning land acquisition for construction of infrastructure, were incomplete, insufficient, not sufficiently substantiated and inadequately reasoned. Valuation reports only in part, or not at all corresponded to the requirements of international standards, and consequently, of poor quality, and the reliability of final valuations rather risky. Valuation reports were insufficient at the very indication of bases taken for value assessment, and in particular at using the legal bases and rules of value assessment profession.

Based on these findings, the Court of Auditors called on the Government to abolish these irregularities, and to:

- prepare a methodology of value assessment and relevant implementing regulation,
- unify legal bases governing the competences for implementation of value assessments, and
- set up the appropriate records on compensations paid.

There are many complaints against appraisers in general. Hereinafter, a case resounding in the media is presented, in a Municipality in Slovenia (as the case has not been finalised at the court, it is not indicated as a source), where the appraiser assessed the market value of land for sale according to instructions of the Municipality, at a price lower than its market value, whereby the Municipality Budget suffered a loss of around EUR 5.5 million. And, what is even worse, the Municipality sold comparable plots of land at a price of EUR 130/m^2, and in this particular case, only of EUR 86/m^2, as much as assessed by the appraiser/valuator according to instructions of the Municipality.

By analysing 55 valuation reports, which were accessible on the Internet in 2015 (Rogelj, 2015), prepared for the different purposes, the minimum purport of assessment reports was ascertained. Individual elements of valuation report were analysed: does the valuation report comprise such elements, and if yes, are they appropriately stated. Most errors and inadequate indications were found in conjunction with:

- commentary to assessed value,
- argumentation of adaptations,
- analysis of economic situation in the country, and analysis of real estate market,
- date of real estate valuation, indication of sources and regulations used, date of visit to relevant real estate, real estate identification (land register, land cadastre etc.), purpose of valuation, identification of commissioner, date of preparation of valuation report, any possible restrictions in using the valuation report etc.

Due to absence of certain elements from the valuation report, problems arise at revision of valuation report and assessment on whether the error committed in the valuation report significantly impacts the assessed real estate value.

Individual professional associations, as for instance the Association of Court Experts and Valuators in Civil Construction of Slovenia / Združenje sodnih izvedencev in cenilcev gradbene stroke Slovenije (SICGRAS), have been endeavouring to reach a higher level in this profession. Within SICGRAS there is currently developed the typical structure of a valuation report, which will be upgraded with the more specific recommendations within the particular purports (Šubic Kovač, 2017). In addition, also the State is endeavouring to regulate the individual real estate valuation by regulating the conditions in the field of court valuation, where a new law on court valuators is in preparation, which should regulate also the control of the work of valuators. The first methodology of individual real estate valuation is envisaged to be prepared as well.

4. First attempts of regulation of individual real estate valuation in Slovenia

Act of 2010 lays down that: The appraiser shall, in preparing real estate value assessment for the purpose of siting public infrastructure:

- data kept in the official and/or public records, and/or
- data on generalised market value kept by the Geodesic Administration of the Republic of Slovenia according to regulations on record-keeping of real estate and regulations on mass valuation of real estate,
- data obtained from owner, and
- methodology to be defined by the Government.

In such a case, the appraisers would use the same database and the same real estate valuation models. For this reason, according to the opinion of the legislator, their approach to valuation would be more objective, and there would be less disagreements of owners, and shortened court proceedings. To this end, a proposal of real estate value assessment methodology, which governs the individual real estate valuation, was prepared, using data and models of mass real estate valuation and International valuation standards (2017).

Professional public did not support the proposal methodology. Among other reasons, owing to non-transparency of the basis, namely, the models of mass real estate valuation, which

comprise a great number of factors. In addition, data on real estate in the real estate register deviate from the actual state. Thus, it may be anticipated that the assessed real estate market values will deviate from the real estate sales prices.

Furthermore, the proposed methodology comprises in the assessment a great number of factors, in relation to which it has not appropriately been substantiated that they in fact do impact the value of real estate within the proposed extent. In determining the size of adaptation factors, the submitter of this proposal refers to the "experiences" of four (4!) Slovenian appraisers, who had cooperated in the methodology creation project.

The new Act of 2017 indicated approximately such regulation of individual real estate valuation only as a temporary solution (Article 291), namely, pending the legislative regulation of the methodology of real estate value assessment, of damages on real estate and of other costs incurred for the purpose of siting spatial arrangements (infrastructure) of national importance.

5. Final conclusions and findings

Prior to 2017 in Slovenia, expropriation for the public benefit was governed by different laws (namely, by the Act of 2002 and by the Act of 2010), and without the reciprocal hierarchy (for instance, a subordinated law grants advantages to owners, which is not stipulated by the fundamental law). The procedures were inadequate regarding the provision of private property, because the owner does not obtain a compensation after the State or Municipality becomes the owner of expropriated real estate. The procedures were inadequate regarding the determination of compensation for expropriated real estate, which essentially affected the timely acquisition of land for construction.

For this reason, also the field of individual real estate valuation should be regulated more expansively, than envisaged by the new Act of 2017, namely, as an integral system, which would offer to appraisers the appropriate expert bases for preparation of appraisals, and which would commit them (through uniform supervision) to preparing the appropriate appraisals (only).

In order to set up a system of individual real estate valuation in Slovenia, the following would be indispensable:

- laying down the uniform scope of contents in the field of real estate valuation by defining at national level the Catalogue of Real Estate Valuation Expertise,
- defining the minimum level of expertise by setting up a certification system for real estate appraisers and provision of quality professional training at convenient prices,
- setting up the improved surveillance of the work of real estate appraisers, and facilitating the more rapid development of the field of real estate valuation by setting up a Chamber of Real Estate Appraisers,

- improving the quality of real estate valuation reports by drawing up Slovenian real estate valuation standards and defining the required typical purport of real estate valuation reports,
- improving the quality of real estate valuation reports by availability for perusal of appropriate data on real estate, real estate market, and information bases for real estate value assessment (construction costs, capitalisation rate, adjustments for real estate valuation etc.),
- in real estate valuation linked to land acquisition for construction of infrastructure, the differences between individual valuations of comparable real estate would decrease by appointing a Team of Appraisers for a particular project, who would prepare the common bases for real estate assessment within the project, and conduct the assessment according to the uniform assessment criteria.

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Olga Petrakovska*, Mariia Mykhalova*

Sustainability Factors in Land Compulsory Purchase Decisions

The article considers the land compulsory purchase as a method of providing land resources for construction of engineering and transport infrastructure objects. An analysis of factors influencing on decision making of land compulsory purchase in the settlements is carried out. The study illustrates the degree of influence of the different groups of factors.

1. Introduction

One main idea of modernity is to ensure the sustainable development of settlements. Science and practice have proven how valuable the development of engineering and transport infrastructure is in order to ensure the living conditions of the population and the functioning of the industry complex both in the country as a whole and on individual territories. Thus, the level of provision of engineering and transport services is one of the factors which directly influence the level of sustainable development of cities.

In some countries where infrastructure already is on a high level and wide public argues that the more streets the more traffic and so much the worse for environment because of the emissions. Comparison of the density of roads and railways in the European Union countries and Ukraine illustrates that the density in Ukraine (280.6 km/km^2 / 35.9 km/km^2) is several times smaller than in Spain (1349.5 km/km^2 / 30.3 km/km^2), Italy (1618.7 km/km^2 / 65.5 km/km^2), Germany (1805.3 km/km^2 / 117.4 km/km^2), France (1749.1 km/km^2 / 53.7 km/km^2). It aggravates population traffic availability and requires new roads construction in Ukraine.

2. Sustainable development in Ukraine

The importance of the developing of engineering and transport infrastructure for sustainable development is expressed international conventions, national development programs, laws, and local legal acts. According to the results of the second UN conference HABITAT-II, held in Istanbul in 1996, the basic principles and goals aimed at the sustainable development of settlements were defined. One of them being the quality of the living environment, which includes social, economical and ecological aspects vital activity of the society.

According to data of the World Bank, in 2015 (WDC, 2015), Ukraine ranked 132nd among 137 countries by the index of sustainable development (0,317). Ukraine is classified inferior to developed countries such as Germany (1,132), Australia (1,122), Switzerland (1,115), Canada (1,11), Sweden (1,109), Denmark (1,104), and Netherlands (1,098).

* Kyiv National University of Construction and Architecture, Department of Land Management and Cadastre, Kyiv/Ukraine.

We compared the highest and lowest indicators of sustainable development: quality of life – Denmark (1,466) and Angola (0,308); degree of harmonization – Sweden (0,989) and Venezuela (0,407); Index Environmental Dimension – Switzerland (0,897) and Mali (0,107); Economic index measurement – Singapore (0,807) and Venezuela (0,253); index of social and institutional dimension – Denmark (0,72) and Yemen (0,208) and life safety – Canada (1,728) and Ukraine, Syria, Turkey, Yemen, Pakistan, Nigeria, Central African Republic, the Philippines and Mexico (0). In Ukraine, all indicators appear to be approximately twice as low as the maximum values (Fig. 1).

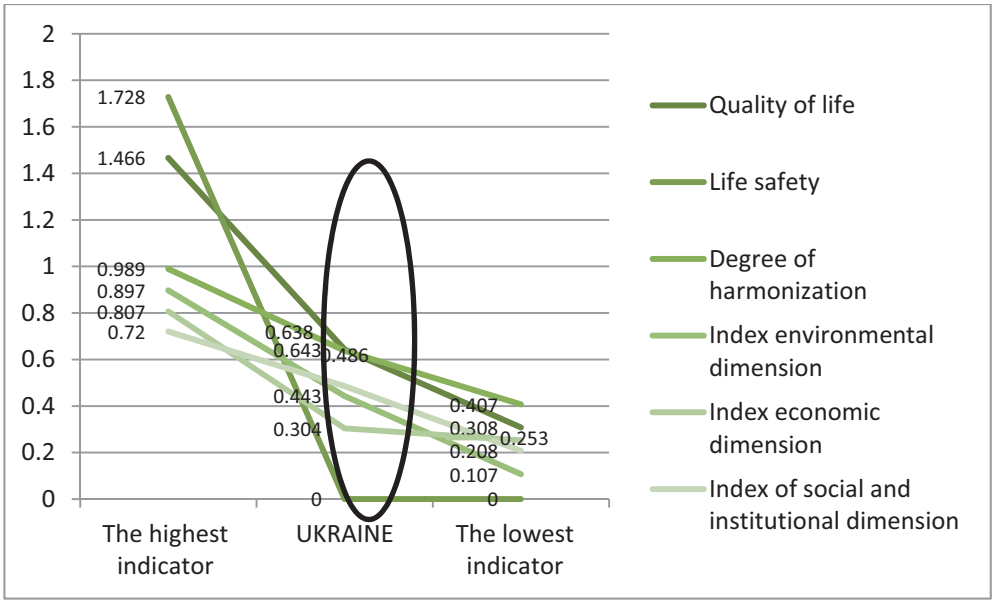

Figure 1: Minimum and maximum values of sustainable development indicators.

Measuring of sustainability is highly controversial and there exist a big number of different methods. It is also mentioned that the UN sustainable development goals want to cover too much, respective indicators are not always convincing, and that usually applied normalization, weighting and aggregation methods arte a kind of arbitrary (Holden et al., 2016; Savić et al., 2016; Garnåsjordet et al., 2012). However, even if it can be criticized, the World Bank Data show that Ukraine has a lot to do to improve sustainability.

According to the main directions of state policy in Ukraine the development of transport and engineering infrastructure plays an important role when implementing the sustainable development concept in settlements. It comprises especially (i) development of all types of passenger transport; (ii) creation of conditions for cycling and the movement of low-mobility population; (iii) the gradual transfer of public highways and rail networks to outside of settlements; (iv) increase of settlements provision by centralized gas supply, water supply and sewage systems (concept of sustainable development of settlements of Ukraine, 1999).

Aggregated indices used to compare Nations are not useful when separate tasks are in the focus. New keys have to be found with respect to their usability in decision making and planning as well as the specific conditions of the affected spatial unit (Jeníček, 2013). In any case, the set of indicators reflects the level of development of the country.

The implementation of these measures requires the provision of land resources taking into account (i) anthropogenic and technogenic burden on the urban areas, (ii) the scarcity of free areas and (iii) the predominance of privately owned land. This increases the problem of providing land resources for the construction of new objects. It entails the necessity to use the instrument of compulsory purchase of privately owned land.

In Ukraine the Main Law concerning compulsory purchase dates from 2009. Nevertheless, planning issues and practical tasks are not completely regulated. So they must be improved in order to select the best alternative variant of decisions which is legally permitted as well as socially and economically efficient within established rules and existing conditions (planning, economic, ecological etc.). The scope allows choosing the best option among the decision alternatives namely those which are as well legally permissible as socially and economically efficient, both within fixed rules and according to the concrete circumstances (planning, economic, ecological, etc.).

3. Analysis of factors which determine the expediency of land compulsory purchase

The aim of the paper is to show up and systematise the relevant factors for the balance of interest with respect to different decision-levels. Valid decisions on the acquisition of land can only be made if the different circumstances and conditions of construction of a new object are fully taken into account. Authors analysed factors affecting the economic feasibility, the transparency of the procedure and the social expediency of compulsory purchase and identified the most important. The study is based (i) on a generalization of normative-legal regulations in order to get a comprehensive view on legally defined interests, (ii) on thought experiments as well as on real cases to illuminate likely situations, and (iii) on practical experience both foreign (Kalbro, 2001; Kalbro, 2004; Viitanen, 2000) and Ukrainian (Lizunova and Mykhalova, 2011; Petrakovska and Mykhalova, 2015). For more detail see Mykhalova (2017).

A multitude of factors has been analysed in the following sequence: factors generalization, systematization and determination of their hierarchy. Interests of all stakeholders were taken into account too.

The factors were analysed in response to the criteria (importance, costs and yield, negative impacts minimising, correctness) for decision-making (Jeníček, 2013).

As a result of factors generalization, their diversity and multidimensional were designated. When systematizing the set of factors, it's found that they influence on the decision making on three hierarchical levels:

- municipality territory;
- the set of land plots for public need;
- individual land plots (compulsory purchased in part or completely).

Such hierarchical division of factors is caused by different interests of stakeholders involved in compulsory purchase – municipality administrations, investors of the construction of new object and land owners/users. To get a reasonable and fair final decision, the interests of stakeholder parties must be taken into account.

It has to be noted that the set of factors which should be considered for individual land plots are different for cases of completely and of partial land compulsory purchase.

In terms of improving the living conditions of the population during the object construction, it is, first of all, necessary to take into account the population needs and transport conditions in accordance with the functional and the planning structure of the area. It is important to recognize the need to construct transport infrastructure as a consequence of societal needs.

Once the social significance and necessity of the object have been established, the economic feasibility of construction should be determined. For this, we analysed the entire area, in particular the land plots located in the construction area of transport and engineering infrastructure objects.

From the point of view of the object investment attractiveness (the investor's interest), the focus is on cost minimisation and profit maximisation. Consequently, the factors that determine the extent of these issues are actually taken into account.

During compulsory purchase particular attention should be given to the problems of owners/users of land plots which are subject to acquisition. One should recognize the difference, for

Table 1: Number of main determining factors in each factor-group on different spatial levels

Levels / Groups of Factors	Municipality territory	The set of land plots for public need	Individual land plots	
			Fully compulsory purchased	Partially compulsory purchased
Functionally-planning	7	5	2	4
Economic	3	5	3	4
Administrative-legal	3	6	3	4
Social	2	0	0	0
Natural	2	4	0	1
Environmental	2	1	0	1

example, between commercial and residential buildings. In the case of commercial development, the owner can lose business (profit), under changing locations conditions. In the case of housing, the owner is not only exposed to economic but also psychological and social consequences.

As a result of the analysis, the main determining factors were identified, and clustered into six thematic groups: functionally-planning, economic, administrative-legal, social, natural and environmental. The groups of factors were formed taking into account the fact that each of them should be corresponded to all levels (Table 1). To do this the results of the analysis are structured in the named four distinct categories of land plots and plot-groups each of them representing decision-maker-groups (private or official) with an unlike range of power to make decisions on the use of land plots involved. Table 1 shows the number of factors we found with respect to different factor-groups at different levels.

4. Findings

Some factors are not described in this paper as they showed to be not particularly important in Ukraine. In the following, only some of the main determining factors are described in more detail (for full description see Mykhalova, 2017).

4.1. Functionally-planning factors

Level of municipality territory
In our opinion, the most important functional planning factors at this level are:

- The city development perspectives which include the direction of spatial development, the prospects for the development of residential, public and industrial areas as well as for communal storage areas, the landscape and recreational areas, the zones of historical and cultural purposes, the funds for natural reserves etc.
- The planning organization of the settlement areas which is considered as a spatial combination of functional elements (residential, industrial, recreational etc.).
- The transport infrastructure which characterizes types of transport, density of transport connections, bandwidth, transport load, etc.
- Similarly engineering infrastructure is considered: power, density, depth utilities and more.

Level of the land-plots-set for public need
Functionally-planning factors are important for the investor also. Planning characteristics of a road (as example of public need) are determined by its significance and the length.

It is evident that the number of land plots that need to be compulsory purchased potentially depends on the *length and width of the road*. The examination of *alternative road trails* is crucial to get reasonable solutions. For roads with same length, *number of land plots that need to be compulsory purchased* can change, depending on direction of route. In addition, the

difference in variety of land use kind directly affects at adjustment and approval procedures which in turn leads to complication and increasing prices in the compulsory procedure.

Level of individual land plots
The group of functionally-planning factors is very significant for the landowners / land users in case of *partial compulsory purchase*. With fully compulsory purchased land plot, the land owner receives compensation and potentially has the opportunity to purchase another property of same value. In case of partial compulsory purchase, the owner must continue to manage the remaining part of the land plot with all the consequences resulting from the construction, both positive and negative. In case of a complete alienation of land plot's decision-making depends in particular on *the functional characteristics of the approved land use*. Partial alienation is mainly due to functional-planning factors, namely *the location of buildings and structures on the land plot and architectural-planning characteristics of the remaining part of the property*.

The aspects of partial compulsory purchase become visible on the examples of built-up and free from development land plot. In both cases, the loss of land value depends not only on the area to be compulsory purchased, but also on area and configuration of the remaining land plot. In the case of built-up land plot the location of buildings and structures must also is taken into account. It is clear from the above that in the case of a partial compulsory purchase the larger number of factors determine the appropriateness of the decision.

4.2. Economic factors

At all three levels, economic feasibility of construction is determined by a group of economic factors. In general they reflect: *the availability of natural resources (areas), the economic potential of the city, the communal financial capacity, the source of the investments (state, municipal or private) and their volumes, the financial interest of the landowners/users, the ratio between the purchase-costs and the total amount of construction project costs, the purchase price, compensation payments and the losses of real estate value.*

4.3. Administrative-legal factors

The group of administrative-legal factors reflects that the implementation of various legally established procedures are mandatory for all interested parties in the land compulsory purchase process. The number of such procedures depends on the planned activities and the legal requirements of spatial planning and design documentation, the consistency of the legal framework, the property rights and the legality of possession and use of real estate, the authorized land use and so on. *Transparency of the compulsory purchase procedure and purchase price determination* play not less important role in decision-making.

4.4. Social factors

Among the social factors it is worth emphasizing the *importance of public need*, which can be expressed by the *city population* that is interested in its implementation, or the *influence of this object on the development and efficiency of material and immaterial production*. In the

general approach, it may be represented by public needs of national, regional, local and sectoral significance. As a result of the analysis it was found that social factors influence decision-making mainly at the level of the municipality territory.

4.5. Natural factors

In the group of natural factors as main affecting were considered: *geomorphological, geological, hydrological and hydrogeological conditions*. It should be noted that natural factors become important for the investor during construction and should be taken into account when choosing the location of the planned object.4.6 Environmental factors

The group of environmental factors involves the need to take into account (i) *the current environmental conditions in the construction area*, which impact on the land value, and (ii) *environmental implications of construction*. The analysis found that environmental factors play a more significant role for owner/users when the land plot is compulsory purchased partly.

5. Conclusions

As a result of the analysis of the set of factors, it was revealed that factors on three hierarchical levels should be taken into account when making decision on land compulsory purchase: Municipality territory; the set of land plots for public need; individual land plots (compulsory purchased in part or completely). The factors are grouped into functionally-planning, economic, administrative-legal, social, natural, environmental.

A comprehensive analysis of the factors indicates: the groups of factors "functional-planning", "administrative-legal" and "economic" impact on decision-making on compulsory purchase at all defined levels. From the point of spatial organization, they determine the expediency of choosing the object location. At the same time, they also look at the property (third level) because its specific characteristics have a significant influence on the costs of construction and trigger compensation costs, which in turn have an impact on the decision-making process. They play the most important role in determining the expediency of compulsory purchase in a partial alienation. Next in significance are the groups of administrative-legal and economic factors. Transparency and optimization of administrative procedures and legal transactions, defined by the legislation, determine the comprehensibility and necessity of the implemented measures, which aimed at ensuring and enforcing property rights. The importance of economic factors is well-known and already practically proved.

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Armands Auziņš*

Land Value Capture for Balanced Socio-Economic Development: A Case of Latvia

Latvian experience in covering development costs and absorbing value increase

Abstract

It is often argued that investments in infrastructure development improve the accessibility of the locations connected to the infrastructure, with the result that property values in those locations increase. However, such an argument needs to be tested through empirical research by exploring the institutional framework and land use planning and development practice. By capturing value increase, it should be used for specific purposes in the way that would lead to finding equity solutions in implementation of infrastructure projects. Accordingly, the interests between private developers and local society have to be balanced as well as fair decision-making towards covering development costs and absorbing the value surplus promoted. The purpose of the study is to give an overview of the land value capture (LVC) as well as to discuss how balanced is the socio-economic development and what is the institutional environment supporting it in Latvia. The competence of local authorities and spatial planning system have been analysed in the study. Direct and indirect models, which are used for the absorption of the surplus value of developed land, have been observed in the study. The outcome of the research shows an interim conclusion for Latvia that can contribute to an extended study and comparative research to get an overview of public value capture across Europe.

1. Introduction

Land use planning may be considered as an integrated part into land management system. Accordingly, land use is being planned by elaborating spatial development/land use plans. In Latvia, as in many parts of the world, the local governments take the responsibility for decision-making to develop these plans (Spatial Development Planning Law 2011). However, such local stakeholders as property owners and developers implement these plans through management of the properties and development of necessary infrastructure and buildings in accordance with planning regulations, including functional zoning, permitted land use and set land use restrictions in a specific territory.

Challenging issues towards an intensification of land use cause many effects and arise a key question to be answered – how to manage a growing pressure of human needs (food, resource exploitation, well-being) while at the same time minimizing the impact on the

* Riga Technical University, Institute of Civil Engineering and Real Estate Economics, Riga/Latvia.

environment (ecosystems liveability, biodiversity, resource renewability, eco-services)? 'Sustainable intensification' is a suggested but vague term that needs to be clarified through land use policies, however, it can be applied to meet the mentioned issues (Petersen and Snapp, 2015). The intensification of land use may form such negative effects to the traditional lifestyle in respective territories as unreasonable urban sprawl, poor environmental quality, insufficient biodiversity to perform an ecological function, decrease in value of eco-services, degradation of cultural landscapes, etc.

One can put forward the thesis that the potential for local development should be assessed and then supported by the municipal decision. But, when considering the value capture of developed land, private and public involvements, trade-offs between various land use interests, motivation and needs for improvements/cost recovery, the main question should be addressed – who (owners, inhabitants), based on what (a system, institutions, plans) and how much (an amount in terms of money) have to contribute financially in order to manage improvements in best equity way possible? LVC is closely linked to the institutions that define property in land. Value capture focuses on realizing as public revenue, i.e. through taxes, fees, or in-kind services, some portion of the increase in land value that stems from these latter changes (Ingram and Hong, 2012). A concept of public value capture can be seen as a method or a strategy to capture value increase to use it for specific purposes (de Wolff, 2007), e.g. for improvement of public infrastructure through local development. Land development measures refer to qualitative changes in land use intensity, involvement of various stakeholders, and facing noteworthy challenges and problem issues during its implementation (Jürgenson et al., 2017). Hendricks (2015) distinguishes between the models for the absorption of the surplus value of developed land and gives a comprehensive overview of established tools to refinance the costs of urban development to open the mind of experts working with allocation of local resources. Some comparative analysis recently employed direct and indirect models and highlighted on the importance of interrelation between land use planning and implementation of the plans for local development (Hendricks et al., 2017, Jürgenson et al., 2017). The discussion in these comparative studies calls for further collaborative scientific research involving at least all European countries.

The *aim of the study* is (1) to give an overview of the LVC and (2) to discuss how balanced is the socio-economic development and what is the institutional environment supporting it in Latvia. Accordingly, the performance of local authorities and the instruments of spatial planning system have been explored as well as the interrelation between both processes (1) spatial planning and (2) construction has been designed in the study. Direct and indirect value capturing has been analysed by using Alterman's (2012) proposed models. Main results of the study have been showed and discussed basically on the basis of logical-constructive technique. Data for the study was achieved mainly from the analysis of legal regulations of central and local governments as well as from the research of local land use management practices.

2. Local authorities and planning system

After administrative territorial reform (since 2009) in the field of public law 119 local governments (municipalities) perform the autonomous functions prescribed by Law in Latvia. According to the spatial development plan a municipality determines the procedures for land use and development as well as provides the lawfulness of the construction process in the relevant administrative territory. Moreover, a municipality is responsible for an organisation of communal services (utilities) for inhabitants (e.g. water supply and sewerage, heating, and waste management) regardless of the housing ownership as well as takes care of improvements and sanitary cleanliness in the relevant administrative territory (e.g. building, reconstructing and maintaining of roads, streets and squares, creation and management of parks and green areas, and flood prevention measures).[1]

2.1. Spatial planning system

Most regulatory planning systems have two levels of statutory (legally binding) plans at local planning level: an overall (comprehensive) plan and a detailed plan (Kule and Røsnes, 2010; 2011). However, the Latvian system includes more specific statements, covering descriptions of existing land uses, preconditions for development, development objectives and directions, existing planning policies, land use and building provisions with zoning for future uses, and public participation. At the end of year 2011 the new Spatial Development Planning Law was adopted by the Parliament of the Republic of Latvia (Spatial Development Planning Law 2011). The Law introduces a local plan as an additional planning document in hierarchy between both comprehensive and detailed plans. On the one hand, such legislative change may lead to more flexible planning system, but, on the other hand, it may cause to more complex interpretation of regulatory norms in the cases of changes in functional zoning, and so, in land use (Auziņš, 2017).

The planning as a land use and development control system in Latvia follows 'comprehensive integrated' and participatory approaches, and locus of power towards decentralisation

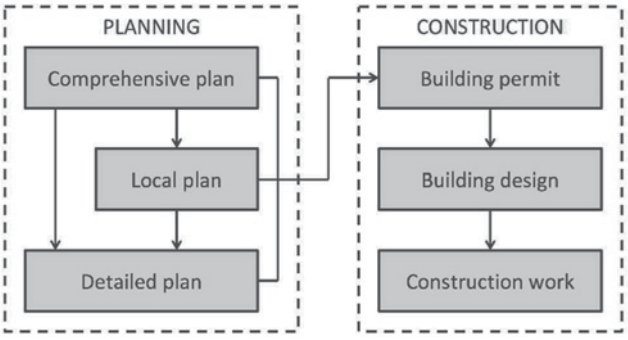

Figure 1: The relation between planning and construction processes in Latvia.

[1] Law "on Local Governments", Chapter II, Section 15.

can be observed there. However, the municipalities have to consider the national and regional priorities and interests acknowledged by respective strategies as guidelines for sustainable development planning. The relation between spatial development planning and construction processes in simplified way is shown in Figure 1. Spatial development/land use planning is basically a local governmental concern in Latvia.

2.2. Comprehensive plans and local plans

The municipalities must elaborate and approve comprehensive plans covering its entire territory. A *comprehensive plan* is a long-term document of spatial development planning, laying down the requirements for land use and development, includes a functional zoning, public infrastructure, regulations regarding land use and building as well as other conditions for land use (e.g. land use restrictions). This plan as legally binding parts includes a graphical part of permitted land use and regulations on land use and building. Besides a comprehensive plan every municipality carries out: (1) a *sustainable development strategy*, which is a long-term spatial development planning document, laying down the vision, objectives, priorities of the planning region or local government long-term development and spatial development perspective; and (2) a *development programme*, which is a mid-term spatial development planning document, laying down mid-term priorities and the set of measures for implementation of long-term strategic goals set out in the planning region or local government development strategy. Both strategy and programme are not legally binding, they are concerned with planning guidelines and support decision-making as well as they have no direct relation to the construction process.

A *local plan* is a long-term spatial development planning document, developed for a part of the city, a municipality town or its part, a village or its part, or a part of rural territory for solving a planning task or detailing or amending a comprehensive plan. The local plans have also legally binding parts, which among other provisions may provide changes into permitted land use if those are in compliance with the objectives of sustainable development strategy of the municipality.

2.3. Detailed plans

A *detailed plan* of a part of municipal territory should be developed in order to lay down the requirements for the use of specific land units and building parameters as well as to adjust the borders of land units and restrictions. The detailed plans have also legally binding parts, but these cannot provide changes into permitted land use. A detailed plan is mandatory before commencing new construction or subdivision of land units if it creates a necessity for complex solutions and unless laid down otherwise in laws and regulations. A local government shall define in the work task the necessity for the developing of a detailed plan and the level of detail, taking into account the justification for the developing. A local government shall approve a detailed plan with a general administrative act, relating it to the land unit, and it shall come into effect after announcement thereof. A detailed plan shall be in effect until it is cancelled or repealed. A detailed plan shall lose validity also in the case if the time

period for commencing the implementation thereof has expired and it has not been extended within a year after the end of such time period.[2]

2.4. Thematic plans

The *thematic plans* may be designed and incorporated with an appropriate type of spatial development plan, and according to the scale and the requirements for solving specific issues refer to the development of particular sectors (e.g. transport infrastructure, layout of healthcare institutions and educational establishments) or specific themes (e.g. layout of engineering networks, valuable landscape areas and risk territories) according to the planning level. These plans are intended for survey and thus are not legally binding.

3. Models for the capture of the surplus value of developed land

3.1. Direct models – direct value capture

The implementation of detailed plans

A detailed plan shall be implemented according to an *administrative contract* concluded between the local government and the developer. A contract shall, in accordance with the provisions of the Administrative Procedure Law, contain various conditions, time periods and disclaimers regarding cancellation as well as requirements concerning the time period for commencement of construction work of objects, management of the detailed plan territory and public infrastructure, construction stages and consequence thereof. A local government may specify the time period within which the implementation of the detailed plan is to be commenced – building (use) of the detailed plan territory in compliance with the detailed plan solution and the requirements specified. Subdivision or merging (reallotment) of land units according to the detailed plan shall not be considered to be the implementation of the detailed plan.[3] However, if reallotment is considered for new development area but an infrastructure for streets has not been created, about 20% of the territory designed to readjust should be intended for public open space, e.g. streets, green areas, etc. Accordingly, for development of a new infrastructure objects as streets, roads, main utility networks and constructions, the territory should be detached as a land unit (e.g. a territory for transport infrastructure and/or a territory for technical building.[4] After development such a land unit may be transacted to the municipality for its further management.

Financing of local plans and detailed plans

The elaboration of both a local plan and a detailed plan can be initiated by private entity (developer), but all binding decisions are made by the municipality. Accordingly, if an initiator entirely or partly finances the elaboration of either a local plan or a detailed plan, a

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2 Spatial Development Planning Law, Chapter V, Sections 28 and 29.

3 Spatial Development Planning Law, Chapter V, Section 31.

4 Regulations No 240 of the Cabinet of Ministers "General regulations for the planning, use and building of the territory", Section 2 and Section 6.

contract on elaboration and financing of the plan has to be concluded. The contract contains: parties, a time schedule, actions, funding, rights and responsibilities. A municipality can extend the territory for planning indicated by an initiator, if according to proposed building the complex solutions (including public infrastructure) within broader territory are necessary. Co-financing is calculated proportionally to contribution/costs of each involved party.[5]

Regulations on land use and building

The regulations regarding land use and building are concerned with the provisions for land use and development and form a binding part of comprehensive, local and detailed plans. The provisions contain various requirements for different types of plans considering the appropriate level of detailing and specificity. But, in general, the regulations determine e.g. requirements for land use at each functional zone and subzone (land-use pattern), building parameters and restrictions. In addition, for detailed plans the conditions regarding accessibility to environment, improvements, engineering and architectonic/landscape solutions are to be specified. The regulations on land use and building can be considered as a source for direct value capturing in a municipality, e.g. they may determine that prior to get building permit for residential building, the developer has to ensure the erection of a street, electricity supply, water supply, and sewerage drain within a development territory. Moreover, after the enforcement of the new plan, a municipality is entitled to decide on higher real property tax due to extension of property rights, e.g. if the land-use pattern in 'open space area' is changed from 'natural land' to 'individual residential land'. In the case if a forestland (more than 0.1ha) is considered for development according to detailed plan (spatial development plan), the compensation for deforestation should be calculated by the authority and paid by developer before issuing of building permit. Sometimes engineering preparation within the development territory is necessary on the costs of a developer (e.g. in the case of high groundwater level, peat layer or brownfield).

Development design and control

A building permit and a building design (project) are issued apart (following) of the planning and thus belong to the construction process and regulated by the Construction Law. A *building permit* is an administrative act with conditions for implementation of a building conception on site – for designing and construction work – until the developed building to be commissioned for exploitation. A building permit shall be issued if the construction conception conforms to the spatial development (comprehensive) plan, local plan (if such has been drawn up) and detailed plan (if such is necessary in accordance with laws and regulations) of a local government, except cases when a construction conception is related to an object of national interest. Additional conditions in relation to the level of detail of a building design may be determined in the regulations of the local government for land use and

5 Regulations No 628 of the Cabinet of Ministers "Regulations on spatial planning documents of local governments", Chapter 6.

building, if they are necessary for a structure to blend with the landscape or the urban environment. A *building design* is an aggregate of graphic and textual documents necessary for the implementation of a building conception. After receipt of a building permit the fulfilment of its conditions is commenced, ensuring drawing up of a building design in the extent laid down in general and special construction regulations, as well as in conformity with the provisions for the land use and building included in the spatial development (comprehensive) plan, local plan and detailed plan of a local government (if it is necessary in accordance with laws and regulations). Both a building permit and a building design are required for the construction of new buildings, for the extensions and for considerable changes in the layout and application of buildings. The *construction works and control* shall be performed, in accordance with the competence specified in the Law, by the building authorities, institutions carrying out the functions of the building authority and building inspectors of the office – persons employed at the relevant institutions who have acquired the right of professional practice in the field of architecture or construction and are registered with the register of building inspectors.[6] The costs of building permit, building design and building control normally covers a developer. A fee for building permit is rather formal and relatively is not large.

Transport infrastructure and public space

The development territories include several types of facilities related to transport infrastructure and availability of public space. These facilities follow the planning regulations and are managed generally considering provisions of land use and building. Usually, if the transport infrastructure (e.g. roads and streets) and public spaces as 'commonly used places' (e.g. green areas, territorial improvements, space for leisure, sports and waters) are placed on developers' (property owners) land, they are responsible for the construction and maintenance costs. In such a case an agreement could be concluded between developer and municipality on sharing management costs. The municipality is responsible for the infrastructure and space/land that belongs to it. In case there are several property owners developing/using the infrastructure, common amenities and space, the agreements should be concluded to distribute and cover the costs.

Engineering communications (utilities)

After approving of the detailed plan, the technical project of a utility (building design) should be carried out for development territory. The development of territory follows the "Implementation arrangements" of the detailed plan in which the construction sequence and responsibilities for main engineering communications (e.g. electricity, water, sewerage, electronic communication (telecommunication), heating) have to be determined. The main structures should be placed within technical and transport infrastructure areas (land-use patterns), but inner engineering communications of the land property unit should be placed according to either the technical project of the utility or technical provisions. The initiator

6 Construction Law, Sections 1 and 15–18.

of the detailed plan (developer) provides designing and construction of main engineering communications (joint utilities), but the owner/user of the building provides construction of the connections to the building. The costs for provision of utilities involve also ones for surveying, topography, territorial improvements and resurfacing. The owner of the utility network (a company) or its lessee according to the contract is responsible for the management of the utility network. Maintenance costs of the utilities normally are covered by user charge (an annual or based on actual consumption). Some networks are managed by the municipality or municipally owned companies, e.g. water supply, sewerage disposal, heat supply, but some – by public or privately owned companies, e.g. power supply, telecommunications, and gas supply.

External and social infrastructure

External and social infrastructure refers to an area outside the development territory and indirectly influences value increase of developed land. Facilities like main roads, broader green areas and main amelioration systems have been regarded as responsibility of a public sector. However, the developer may carry out some external infrastructure that is considered as necessary prerequisite for the development. The objects of social infrastructure like schools, kindergartens and sport grounds may be partly financed on contractual base by developers, however, there are no legal regulations issued by central government regarding development agreements in Latvia. Thus, the development and management of social infrastructure correspond to a public function and should be funded by using municipal tax revenues.

Development agreements

The reason to conclude the *development agreements* appears when the rights and obligations of developers/property owners and municipalities are not defined by statutory regulations. These agreements mainly represent a detailed distribution of costs for infrastructure (also for internal infrastructure inside the development territory) development. As indicated above a detailed plan shall be implemented according to an administrative contract (rights and obligations of parties defined by statutory regulation) concluded between the local government and the developer in the case the developer owns the land and initiates its development. In the case the municipality owns the land, the conditions on land allocation and the price for the land is a matter of negotiation between the municipality and the developer. According to national and EU regulations about state aid requires that the land must be sold at market value. The development agreements sometimes represent the initiative for urban development on the basis of *public private partnership*. Therefore, the benefits of the buildings remain with the private developer (income and profit) and the benefits of the increasing real estate value remain with the municipality (fees and taxes).

Capital gain tax

The capital gain tax is applied if private real properties have been sold in the market. The tax rate is 15% of the capital gain – the difference between the acquisition and selling price with a deduction of demonstrable improvement cost. Capital gain tax goes to the tax income

of central government, but it may be assumed that through a distribution of public goods (e.g. main roads, public transport, etc.) it in general contributes to the increase of the property value in the territory.

3.2. Indirect models – indirect value capture

In Latvia, the immovable property tax represents the indirect model, however, any other types of tax income and fee may be used for improving public infrastructure in the territory of the municipality according to accepted annual financial (budget) plan. Basically, the immovable property tax (PT) and personal income tax (IT) benefit to local authorities and constitutes the main part of their resources. The share of municipal revenues in national consolidated budget constituted 27.4%, i.e. 9.8% of GDP but the share of municipal tax revenue in national tax revenues constituted 19.7%, i.e. 5.7% of GDP in 2014.[7] Tax revenue constituted 59.7% in the revenue structure of municipal core budget in 2014.[8] Although PT for 100% but IT just for 80% is held by municipalities, the financial means from last source prevails significantly. Accordingly, the share of PT in municipal tax revenue constituted 14.6% but the share of IT – 84.7% in average in 2014.[9]

Property tax

PT shall be imposed upon tangible things which are located in the territory of the Republic of Latvia and which cannot be transferred from one place to another without being externally damaged – land, buildings, including the buildings registered in the Cadastre Information System but not transferred into exploitation, and engineering structures.[10] Either property owners or its legal possessors pay PT based on the cadastral value. The State Land Service determines the cadastral value according to common methodology, which in general prescribes the cadastral value base (base values and correction coefficients based on market data analysis).[11] The municipality determines the tax rate different to land and buildings in the range 0.2% – 3% of cadastral value and indicates it in binding regulations. General tax rate is 1.5% from cadastral value of property unit. Residential property is taxed at a rate 0.2%-0.4%-0.6% depending on the value of the property. 3% shall be paid, for instance, for degraded property or neglected agricultural land. The share of PT in municipal tax revenue gradually increases (from 8% in 2008 to 15% in 2014) mainly on the account of increase of cadastral value.

Other taxes, fees and conditions

There are identified other tax income that contributes to the increase of the property value indirectly in the territory. IT tax rate is 23%, and this tax shall be paid by natural persons

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7 Ministry of Finance of the Republic of Latvia, available at http://www.fm.gov.lv/en/.

8 The Treasury of the Republic of Latvia 2007–2016, available at http://www.kase.gov.lv/?object_id=16.

9 State Regional Development Agency, available at http://www.vraa.gov.lv/en/.

10 Law on Immovable Property Tax, Section 1.

11 Immovable Property State Cadastre Law, Section 7.

for their income to the municipality budget, in which the person has been declared residence. Some other taxes shall be paid to the municipality budget, but all together they constitute less than 1% of the share. Moreover, the legal entities, e.g. professional development companies, shall pay an enterprise income tax of 15% of the annual profit in the company, but it benefits from a national core budget. Municipalities are empowered to impose fees according to binding regulations and use these incomes for infrastructure improvements as well. However, the financial equalization fund of local governments (FEF) exists in Latvia, which is concerned with a distributional model among the municipalities to promote 'equal opportunities' to execute their functions. This model is modernized since 2016 but still influences a financial capability of each municipality, including the public investments for land value increase. Some recent local governing initiatives show an interest not to include the revenues from PT into FEF, but to determine this type of taxes as 'infrastructure tax' to be used only for improvement of a local public infrastructure. Also IT tax could be paid considering the workplace of a natural person, and some share of enterprise income tax could benefit from the municipal budget as well. Accordingly, the local authorities could be more interested in better entrepreneurship and investments as well as in better jobs and increased employment at their territories.

4. Conclusion

The 'value steps' of real property development in Baltic countries were summarised recently in the collaborative study (Jürgenson et al., 2017). Accordingly, significant part of the extension of real property rights (spatial development planning) and completely the construction of internal infrastructure and buildings rest on the costs of a developer that create value surplus. Value surplus due to private investments is subject to LVC in Latvia. Conceptually, one has to distinguish between capturing value surplus of the development and covering its costs (also administrative ones). However, all costs for the development influence and create the surplus value to capture it. The development costs and also value surplus of the development are 'shared' between the public body and developer. However, it is challenging research question to identify these shares due to development phases. Land value increase due to extension of property rights benefits both a developer/landowner and a municipality. All types of taxes and fees that create the municipal revenues and are distributed for benefits of local society in a great extent applicable to all property value increase independently of the roots of increasing values. Institutional environment supporting local socio-economic development should be more assessment based and investment friendly. Further collaborative scientific research involving all European countries should be initiated in order to develop a common framework for value capturing and to provide the innovative tools for public value capture based on comparative analysis to optimize the allocation of development costs and benefits as well as to disencumber the public budget.

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Filiz Hervet*

Revenue Sharing: A Tool to Produce Urban Land and Residential Megaprojects in Istanbul

Abstract

The deregulation of land policies in Turkey has helped turn Istanbul into a good metropolis for investment. The financialization of residential real estate has led to the property sector making construction regulations more flexible. The State uses public land to respond to demand from developers and investors. TOKİ (Toplu Konut İdaresi), the Mass Housing Adminitration, has opened up public heritage land for property development to sell it to the biggest Real Estate Investment Company (REIC), Emlak Konut. The property developer then builds brand housing on Emlak Konut's land in exchange for a percentage of the ensuing profits.

This article focuses on revenue sharing as a tool for the creation of property value. We wish to look at how added land value is shared between the actors involved through study of residential projects involving revenue sharing in the Sarıyer district. Analysis of the control of public land and financial statements has led us to assume that this model maximises financial income shared between the actors involved and inscreases the housing price.

Keywords: *Public Land, Revenue Sharing, TOKİ, Emlak Konut, Istanbul*

1. Introduction

Making land law more flexible has become a must in land policies in Istanbul. The urban "anti-density" policy adopted by the Turkish government has driven urban construction megaprojects, which take up a great deal of the available land. Istanbul is growing through the use of peripheral public land where transport infrastructures have been built (the third bridge across the Bosporus and the third airport in the north of town) along with shopping malls and office buildings. However the State particularly makes *hazine* (public property in Turkish) available for residential projects. Istanbul's environment of buildings, including residential properties, is one of the mainstays of the economy (Balaban, 2012). It serves as a basis for the accumulation of assets by national and international investors particularly since Istanbul became a good city for investment. The 2015 Knight Franck report ranked the city first for the attractiveness of the property market in the rented sector (+18% between 2014 and 2015). In this context, the State has to respond to the land requirements of property developers and investors. As a major property owner, the State is the principal purveyor of

* Lab'Urba of Paris-Est University/French Institute of Anatolian Studies/France.

public land. This is the mission of TOKİ (Toplu Konut İdaresi), the Mass Housing Administration, which can define and adapt the urban planning regulations and also adapt and privatize land. These residential megaprojects are more commonly called "brand housing" by property experts and they emerged over the last fifteen years. They consist of enormous residential complexes with between 200 and 6000 homes, which provide services (gym, swimming pool, shops, restaurant, etc.) responding to the expectations of financial investors and buyers. They are often located on the outskirts of town and represent prime sites for the financialization of the city. The developers promote "prestige" and "lifestyle" of these projects, which are exclusively reserved for the urban élites (Serin, 2016).

The financialization of property influences the way in which ground surface is occupied. In Istanbul, the construction sector (6.8% of the country's GDP in the second half of 2017[1]) drives real estate development. Between 2003 and 2007, 78 laws were passed concerning real estate deregulation to facilitate property investments and encourage construction (Balaban, 2012). In the literature on the subject, the adaptation of urban policies to the financial sphere and the market has been studied in Europe (Guionnet and Halbert, 2014; Theurillat, 2011) or in emerging countries such as China and India (Aveline-Dubach, 2013; Denis, 2011) but this phenomenon in Turkey has been the subject of little study. Questions remain to be answered about the strategies underpinning public action particularly in response to the land requirements of property developers and investors when public land is involved. Research into this subject has found there to be an irrational and speculative form of management of public land in Turkey (Dulgeroğlu and Pulat Gökmin, 2009; Keskinok, 2015; Pérouse, 2013; Türk and Altes, 2014). However, few researchers have studied the legal and political strategies used by the State to respond to demand from property developers and investors for urban land. Sales of public land have mainly tended to be destined for luxury projects. TOKİ has used revenue sharing to develop and implement these large-scale residential projects. TOKİ sells a piece of ready-to-develop public land to the Real Estate Investment Company (REIC), Emlak Konut, of which TOKİ is a shareholder. Emlak Konut then runs a call for tender and authorizes the selected property developer to use the land in exchange for a percentage of the profits.

This article focuses on revenue sharing as a tool for the creation of property value. The aim of the research is to analyse the revenue sharing to study how added land value is shared between the actors involved. Two objectives are proposed for a discussion here. First, the revenue sharing could be an interest tool to produce land suitable for building housing by dividing up the costs between the different actors involved. Secondly, this model does not enable property annuities to be redistributed into the urban economy because the public company is unable to get a majority share of the added land value even though it was responsible for enhancing that land's value. To find answers to this question, we shall mainly discuss the commodification of real estate in Istanbul and the TOKİ's role in the creation of real estate value. Then we shall analyse the operational plan for two residential projects

1 Daily Sabah, 14/09/2017, "Construction sector to continue boosting Turkey's economic growth".

involving revenue sharing in the Sarıyer district. We rely on an empirical approach based on interviews carried out in 2017 with the stakeholders (Emlak Konut, developers, the Chamber of Urban Planners, associations, academics …). We also analysed press articles and the operators' balance reports.

2. The commodification of residential real estate in Istanbul

Since the start of the 2000s, properties in Istanbul have increasingly been considered as financial products. The aim of public policies is to obtain and secure national and international investments but such policies have not enabled the financialization of the built environment to be controlled. Gulf investors became interested in the Turkish property market at the start of the 1980s (Tarim, 2016). Various measures have been implemented to facilitate and promote sales of housing. The 2007 law n°5582 authorizes banks to take out mortgages (Sarıoğlu-Erdoğdu, 2014) but this measure has turned out to be ineffective. Mortgage rates fell from 29.3% in 2003 to 10.9% in 2013. The net value of property acquired by foreign buyers between 2004 and 2012 comes to 20.9 billion dollars rising from just 1 billion dollars in the period between 1955 and 2000 (Coşkun, 2016). The 2012 law n°6302 authorized buyers from 183 countries to acquire over 2.5 hectares of property. The implementation of this measure has been influenced by the property developer Ağaoğlu to enable the Saudi investor Abduljawad to buy two towers in the Maslak 1453 project (Beaugrand and Yantaya, 2016). Financial investors are therefore increasingly involved in urban governance (Guionnet and Halbert, 2014). However the proportion of foreign investors buying residential property needs to be considered in context. There were 68,416 new homes sold in Istanbul in 2016 with 7493 bought by foreign investors mainly from Iraq, Kuwait and Saudi Arabia.[2]

The restructuring of the property market was strongly affected by informal urban settlements until the 1980s, providing favourable conditions to those involved in construction. The emergence of thirty-one Real Estate Investment Trusts (REITs) in Turkey shows how financial capital gained entrance to Istanbul. These REITs manage property portfolios and act as financial intermediaries to facilitate the flow of investors' funds towards the property sector. Emlak Konut has property assets estimated at 1 billion euros and is thus the most important REIT in Turkey (Emlak Konut, 2016). TOKİ holds 49.27% of shares in Emlak Konut, which is seen as the priority buyer of public land. In 2014 the association GYODER was created to defend the interest of those involved in property development in Turkey (REITs, property developers, construction companies, banks and property experts) and represents over 180 institutions. The property industry was badly affected by the terrorist attack on June 28th 2016 and by the failed *coup d'état* on July 15th of the same year. Thus to support it, 39 members of GYODER launched a promotional campaign called the "Union of Forces in Real Estate for a Stronger Turkey" (*gayrimenkulde güç birliği daha güçlü türkiye*). From the 1st to the 31st of August 2016, interest rates for 10-year loans were lowered to 0.7% and

2 Turkish Statistical institute, House Sales Statistics, 2017.

down payments on buying a home came down from 25% to 20%. Emlak Konut ran this initiative again from February 1st to March 21st 2017 by proposing loans at preferential rates in partnership with 10 national banks for 30 projects providing 15,000 homes.

The secure and positive image of the Turkish property market has also been constructed by many national and international property consultants/experts (GYODER, Eva Gayrimenkul, Gayrimenkul için Strateji Platformu, REIDIN, JLL, etc.). Others exclusively target investors from the Middle East. This is the case of Imtilak Real Estate whose contact details are displayed in Arab just across the arrivals border at Atatürk airport or Toyo Real Estate which is located in the district of Beylikdüzü, a place highly prized by investors from Middle East. The representation of the market of Istanbul is also constructed at international real estate trade shows. The promotion of the city at the international real estate market provide an opportunity for actors in the property sector to meet and "also consist in attempting to alter the representations associated to a given urban space in order to turn it into an investment space" (Guionnet and Halbert, 2014: 28). At the 28th edition of MIPIM 2017 (international real estate professionals festival) in Cannes, the "impressive visibility" of Turkey with its 1800m^2 stand as compared with the other 90 countries was seen as "a showcase, which was at the least surprising and even disturbing given the current situation".[3] Transport megaprojects are presented as infrastructures aimed at securing investments in residential and office property. This year the third bridge over the Bosporus was spotlighted using the slogan "live the Istanbul Dream, a city between two continents" which is just a 4-hour plane journey from 57 countries. In 2017, Istanbul will host several property trade shows such as the Turkish and Arab Real Estate Summit, the Brand Cities Summit and Construction Trade Show, the Real Estate Development Fair and the 5th Real Estate Summit. At these events, public and private construction actors promote brand residences as a profitable market in which to invest.

3. TOKİ: a speculative tool to mobilize public land?

The financialization of real estate has been greatly encouraged by deregulated land policies. Land policy needs to make buildable land available to respond to demand from investors and property developers. The mobilization of public land is therefore essential for large-scale projects like brand residences. The State delegated this function to TOKİ, which was created in 1984 with its functions modified in 2001 by the arrival in power of the centre-right Islamo-Conservative AKP party. The current government has made TOKİ its main tool for the control of land and property.

Initially, TOKİ was created as an investment fund for housing intended to absorb informal settlements. TOKİ financed 1/3 of housing stock between 1985 and 1990 via cooperatives acting as intermediaries. However from 1988 onwards, loans accorded by banks fell from 71% to 7%. There were 33,833 cooperatives created between 1985 and 1995 but only

3 LaLibre.be, 14/3/17, "Visibilité impressionnante de la Belgique et de la Turquie au MIPIM" (the impressive visibility of Belgium and Turkey *at the MIPIM*).

26,570 were still in activity in 1995 (Türk and Güven, 2008). Law n°4684 dated 20/6/2001 abolished the housing fund and TOKİ became dependent on State budgets. TOKİ took over part of the property assets of Emlak Bankası (which became Emlak Konut) after it went bankrupt during the economic crisis Turkey was going through (Pérouse, 2013). In 2003, law n°4966 dated 6/8/2003 authorized TOKİ to make profits on its operations by collaborating with the private sector. Law n°5273 dated 15/12/2004 transferred the management of 65 million m^2 of public land to TOKİ from the General Directorate of Land Office (*Arsa Ofisi Genel Müdürlüğü*). Finally, the creation of the Ministry of Environment and Urbanization (MEU) accelerated the processes for the modification of urban planning.

TOKİ's land management is a controversial subject in the scientific literature. As the State's representative, TOKİ has to regulate urban planning and property production to reduce inequality in access to housing (Türk and Altes, 2014). TOKİ is described as a "regulator" capable of obtaining added land value, as it possesses powerful land management tools coupled with a large portfolio of public land. Although article 17 of the Turkish Constitution stipulates that the State must be responsible for responding to housing requirements for all (Sarıoğlu-Erdoğdu, 2014), TOKİ "works more according to a more limited, electorally based or market logic than a logic of social and spatial equality" (Pérouse, 2013: 175). Between 2002 and 2017, TOKİ built 779,701 homes including 659,162 social homes (TOKİ, 2017). However, TOKİ trends to build housing only for the middle and upper classes because the housing prices are well above the Turkish minimum wage (400 $/month). For a home of 65–87m^2, a family needs to provide a down payment of 2600$ and pay 170$ per month on average over a period of 20 years (Dulgeroğlu and Pulat Gökmen, 2009). TOKİ's alleged "Robin Hood" approach consisting of selling luxury homes to the rich to redistribute the profits by investing in social housing is therefore just a legend (Pérouse, 2013) even though TOKİ actually possesses the financial tools to develop social housing and can select special zones in which the number of building permits can be increased (Türk and Altes, 2014). Finally, the polysemy of the term "toplu" means both "social" and "collective" and reflects the ambiguity of TOKİ's work.

To ensure the mass production of brand housing, TOKİ attempts to conquer new land. It is of interest to study the legal and political mechanisms TOKİ uses to appropriate Istanbul's natural areas and then transfer them to the private sector. This was the idea behind the adoption in 2012 by the Turkish National Assembly of a law on the decommissioning of state-owned forests known as 2/B land and a second law on "the transformation of land in danger of catastrophes".

Housing situated on 2/B land is among the types of informal occupation of public land. Law n°6292 provides for the regularization of these spaces which are generally located on the outskirts of the city on the borders of state-owned forests and thus for the attribution of building rights. The public authorities offer occupants the opportunity to buy plots of land from the Public Treasury in exchange for a title deed in due form called the TAPU. However in a context of financial pressure, the majority of the occupants concerned have been unable to negotiate the purchase of land whose value had substantially increased. By regularizing

and privatizing all the 2/B land, the State is thought to have recovered a source of income estimated at 25 billion dollars.[4] The cadastralization and decommissioning of 2/B land began in 2013 and in 2014 the State had already sold off half of this heritage land, namely 1573 km^2 (Atasoy, 2016). In Istanbul, 15,689 hectares of 2/B land were listed with 3379 hectares in the Beykoz district.[5] Part of this land was transferred to the Turkish Finance Ministry and then sold using calls for tender while another part was assigned to TOKİ for urban transformation projects.

Law n°6306 enables TOKİ and the MEU to expropriate and take decisions about building rights in what are considered risk areas. In Istanbul, the MEU classified 1106.25 hectares as risk land and the law does not stipulate whether it will remain as such after being transferred to the public domain or whether it will be used for public interest projects (Tarakçı and Özkan, 2013). This law also paves the way for the acquisition of an estimated 2200 hectares of military land in Istanbul.[6] The law demarcates both risk areas and "stable" zones where the creation of housing should be encouraged. TOKİ covets this military land which is tree-lined, relatively unspoiled by pollution and often well-situated. These last green spaces in the City have been increasingly threatened since the failed Coup d'État on July 15th 2016 because the public authorities have decided to demilitarize large agglomerations (Hervet, 2017). The Istanbul Chamber of Urban Planners[7] considers that this military land should be used for public parks but Turkey's foremost property developer, Ağaoğlu, has already made his intentions clear to TOKİ via the press. He said: "Give me the Maslak military land and I will build 239 houses there (…). We will name this residence after the July 15th martyrs" in an attempt to pay tribute to the 239 families who lost relations during the fighting with soldiers during the *Coup d'État*[8].

4. Land management for brand residences in the Sarıyer district

4.1. Study cases

Among the projects involving revenue sharing (Figure 1) between the trio made up of "TOKİ, Emlak Konut and the property developer", two housing projects – KÖY and Maslak 1453 – are in the delivery phase in the Sarıyer district located to the north of the European side of the city. The Sarıyer district is surrounded by the Bosporus, the Black Sea

4 Hürriyet, le 19/1/8, "25 milyar dolarlık 2B satışı için düğmeye basılıyor" (the button has been pushed to sell the 2/B land for 25 billion dollars).

5 Sabah, le 4/5/12, "İşte İstanbul'un 2B haritası" (the map of 2/B land in Istanbul).

6 This data was given at a forum organized by the Istanbul Chamber of Urban Planners on November 19th 2016 on the theme of "the future of military land in Istanbul".

7 A public institution which serves the general interest and whose status was defined by the Turkish constitution.

8 BİRGün, 8/8/16, "Ağaoğlu: askeri alanları bana verin" (Ağaoğlu: give me the military areas).

and the Belgrade and Fatih forests and was the subject of a great deal of residential development following on from the opening of the 3rd ring road which links this territory to the centre of Istanbul in under 20 minutes. The Sarıyer territory is thus the new urban development hub in the north of the city and has been the subject of numerous modifications to property rights covering public land. In a territory with a surface area of 15,813 hectares, there are 1629 hectares of public land (847 hectares of *hazine*, 585 hectares of land belonging to the Sarıyer district and 187 hectares of land which belonged to the pious foundations[9]) and 255 hectares of military land.[10] It is part of Istanbul's "green belt" and therefore much sought after by property developers who know their housing developments will be easily sold to buyers wishing to live in an environment close to nature.

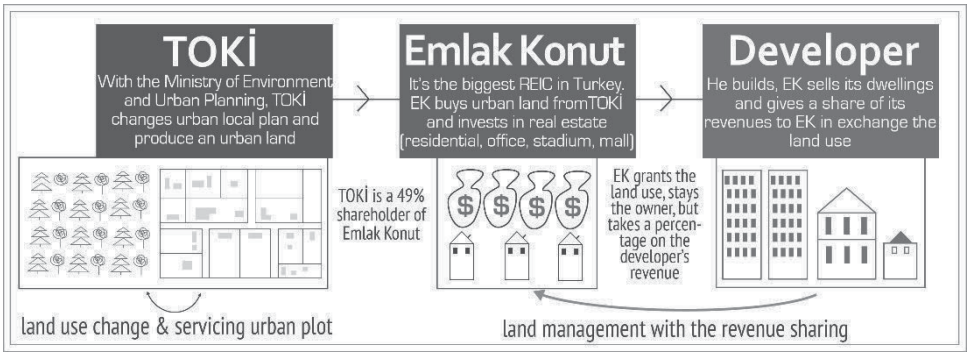

Figure 1: The Revenue Sharing Model to Develop Urban Land (source: Hervet, October 2016).

The KÖY project is located in the Zekeriyaköy neighbourhood, which has been the main bourgeois area in Istanbul since the end of the 1990s. This project offers individual homes in the form of villas of between 200m² and 691m² and small-scale collective housing with flats ranging from 72m² to 150m². Prices vary from 210,000€ to 2,235,000€. KÖY also plans retail space of 15,000m², a primary school, sports facilities (indoor sports hall, tennis and basketball stadium and a swimming pool), walking and cycling areas, spaces for pets and a children's park. The property developer also highlights the project's nearness to transport hubs. By car, the project is 10 minutes from the 3rd bridge over the Bosporus, 25 minutes from the 3rd airport, 15 minutes from the Maslak business district and 10 minutes from the Hacıosman metro station.

The Maslak 1453 project, whose name is an allusion to the 1453 metres of the main avenue rather than the Fall of Constantinople, is situated to the south of Sarıyer on the edge of Fatih forest. Maslak was originally an industrial and office area but over the last ten years, property policies have gradually turned it into a residential district. Residences such as

9 This data was provided by the Sarıyer district urban planning directorate.

10 This data was provided by the City Planning's Chamber of Istanbul during the forum about "the futur of military's lands in Istanbul".

Mashattan, *Maslak 42* and *My Home* have been built in the middle of the office blocks and residential complexes have continued to increase following the arrival of the metro in 2009. The car industry zone Atatürk Oto Sanayi with its 2560 repair workshops seems to have become a prime site for real estate investment. An urban renovation project plans to move this industrial area to Silivri (on the west side of Istanbul) and 70% of owners are said to have made deals with developers such as Taşyapı İnşaat, Nurol and Doğuş. The superficy of Maslak 1453's land is 201,000 m^2 the land was a military area *and hazine* occupied by an informal settlement zone. The prices of the homes are also slightly lower, ranging from 140,000€ to 530,000€. Emlak Konut chose the property developer Ağaoğlu to build on the two million m^2 of ground surface. Ali Ağaoğlu is the 38th richest person in Turkey and the subject of much media attention (for example, news channels covered his daughter's wedding, focusing on her 850,000€ ring and 300,000€ dress). He is currently building 17 residential projects and 5 office projects in the metropolis. This property complex is made up of 4789 homes, shops, a private university, restaurants, a cinema, a sports complex and so forth. As with many brand projects, its proximity to green spaces has been made a strong selling point. The two plots of tree-lined military land around the project will become parks where no building will be allowed according to the sales director.

4.2. From rural land to building land: a history of property struggles

Making land buildable involves various property struggles between the initiators of a project (TOKİ, Emlak Konut and the property developer) and local interest groups such as inhabitants, owners, chambers of urban planners or ecological associations.

In 1938, the "Forest" law n°3116 designated KÖY's land as a public forest but in 1959, to protect the area from the "Russian threat" (the site is near the Black Sea), the State decided to transfer the land to the Defence Ministry and turn it into a missile base. The General Forestry Directorate changed the land's status and expropriated the part occupied by villagers who had themselves appropriated this land. The property was transferred amicably. The villagers were proud to serve the nation by giving up the land for no financial compensation. In 1977, 34 plots of land were officially transferred to the Defence Ministry and the Istanbul Regional Council classified the zone as a "3rd degree natural site", thus forbidding construction thereon. Over the years, Zekeriyaköy was subjected to property-linked pressure and the land became surrounded by gated-communities. TOKİ saw it as a business opportunity and signed an agreement with the army in 2006 to become the owner of the land.

Maslak 1453 is built on military land, which had housed the National Police High Command but some of the plots of land were illegally occupied. The Tozlu family had settled on the land in 1972 and built a building with 9 rooms and 2 shops. In 2009, TOKİ apparently came to an agreement with the family for their land to become part of the project. There was no real re-housing agreement but the building and the garden with its fruit trees were bulldozed so the property developer could install a sales office on the land. The same year, TOKİ ceded another public plot of land near Ayazağa cemetery (in a neighbouring district to Maslak) to the property developer Ağaoğlu. TOKİ offered Ağaoğlu a 29-year long-term

lease to administer part of Fatih Forest, which was to serve as the central Park for the Maslak 1453 project.

In 2010, the General Forestry Directorate warned of the threat posed by the KÖY project to the surrounding forest but in March 2011 TOKİ sold the land, which was not yet buildable to Emlak Konut. It was only later that the MEU approved the new zoning plan at a scale of 1/5000, which defined the new land rights. The Chamber took the case to court for the first time while the property developer Siyah Kalem was selected by Emlak Konut on June 21st 2012 for a project involving "revenue sharing". On August 14th 2013, the MEU approved a modification to the zoning plan which increased the buildable surface areas and led the Chamber to go to court for a second time. A year later, the State Council decided to stop the plan being implemented. Despite the legal decision, the district municipality allocated the building permit on July 25th 2014 and this despite the Mayor from the Republican People's Party (*Cumhuriyet Halk Partisi* – CHP, the main opposition party to AKP) having made an electoral promise to stop the construction work. In 2015 demonstrations were organized by the Sarıyer association for Urban Solidarity (*Sarıyer Kent Dayanışması*) with the support of the Northern Forests Defence association (*Kuzey Ormanları Savunması* – KOS) to increase public awareness of the situation.

To begin the modification of the plans for the project Maslak 1453, TOKİ signed an agreement with the army to acquire the land. On August 11th 2010, in compliance with law n°775, the public company designated the area occupied informally to drive the creation of a new zoning plan. The same year, TOKİ sold the land to Emlak Konut. In 2011, the MEU and the Greater Istanbul Municipality (MGI) approved the project's urban planning. To avoid the project being blocked at municipal level, particularly for obtaining building permits, the MGI transferred the administration of the Maslak and Ayazağa neighbourhoods from the Şişli district to Sarıyer. This was because until 2012 Sarıyer was an AKP district while the mayor of Şişli was from the CHP party. As a result of the Chamber's legal case, the State Council cancelled the plans on March 26th 2013.

4.3. Revenue sharing and property charges

TOKİ can make the urban planning rules for its own land, which effectively creates a tool for the creation of property value. One of TOKİ's main advantages is that it can decide on building rights and get them approved by the MEU. Article 18 of law n°3194 on urban planning stipulates that TOKİ must prepare its land before selling it. TOKİ divides its land up, prepares it for building and sells ready-to-build land to Emlak Konut. Emlak Konut bases its proposals to buy land on the so-called countdown principle (the price of land depends on the number of realizable housing) (table 1). For the KÖY project for example, the property charges resulting from revenues (sales of homes) subtracted from spending (construction costs and profit margin) was estimated at 217 million Turkish lira (around 72

million euros).[11] However as the profit margin was greater than the true figure[12], Emlak Konut made an offer of 252 million TL (around 84 million euros).

Table 1: Land value for the project KÖY (source: Emlak Konut, 2011)

FINANCIAL BALANCE SHEET			m2
Plot area			502 386
Area for public spaces (40%)			200 954,40
Buildable area			301 431,60
Floor area ratio permitted			113 036,85
COSTS			
Kind of costs	**area (m2)**	**Value by unity (TL/m2)**	**Value (TL)**
Total of construction costs	113 036,85	1 000	113 036 850
REVENUES			
Kind of revenues	**area (m2)**	**Value by unity (TL/m2)**	**Value (TL)**
Profits : housing sells	108 515,38	5 000	542 576 880
Profit margin			40%
Revenues valuation			217 030 752
LAND VALUE			
Land value (TL)			325 766 128
Financial proposal (TL)			252 000 000

For the Zekeriyaköy residential project, Emlak Konut selected the property developer Siyah Kalem ahead of 8 other candidates. Siyah Kalem had already worked with TOKİ on the construction of over 7000 homes and managed all stages of the project (design and construction). For the KÖY project, Emlak Konut made Siyah Kalem an offer of 491 million euros with the property developer paying back a 32.35% share, which came to 157 million euros. Emlak Konut remained the owner of the land but the property developer had the right to develop it. All revenues from sales of homes went into a secure account (*yediemin hesabı*) controlled by Emlak Konut and the property developer received his share as sales progressed according to ongoing spending on the construction work. Even if the property developer did not manage to sell all the property, Emlak Konut still had to pay the amount which was owed. The property developer also had to construct sports facilities, schools, a mosque and internal roads within the residence.

For the Maslak 1453 project, the value of the land also depends on revenues from the project, which were estimated at 1.5 billion euros. Although the land area is small, the potential for construction is much greater than the KÖY land. Emlak Konut bought the land from TOKİ for 407 million euros after requesting an estimation of the value by a specialist assessment firm. The property developer Ağaoğlu won the call for tender. A joint venture involving the Saudi investment company Abduljawad Holding and the Thai luxury hotel chain

11 At this time, the exchange rate was 1 euro = 3 lira.

12 More like around 20% according to an interview with Emlak Konut's urban transformation director.

Dusit joined the project to buy two towers. The property developer had to pay Emlak Konut 35.5% of the revenue (around 532 million euros).

5. Conclusion: what about the distribution of land value?

The financialization of land and property has driven public policies towards increasing levels of deregulation. Firstly, according to our analysis of the revenue sharing, this model is an interest tool to produce urban land for large-scale projects. But, the aim of the revenue sharing is to increase the value of public land and to produce housing for the upper-income groups. It is the reason why the government gave TOKİ more power for the administration of public and natural land. Its authoritarian attitude to land management can be seen in its urban planning work. Legal cases brought by opponents to projects are generally in vain because TOKİ can acquire any land at all and decide on the building rights. Then, public and private construction actors have strongly promoted Istanbul on the international residential property market. Real estate trade shows and assessment reports have all contributed to strengthening Istanbul's image as a good city for investment. Finally the political, economic and social crisis Turkey has been undergoing since 2013 (demonstrations against urban projects, terrorist attacks, the migration crisis, the shift towards authoritarian government, etc.) has led Turkish government and property actors to double their efforts to support investment in residential real estate (gigantic Turkish stands in international real estate trade fairs, loans at preferential rates to buy homes, etc.).

The financialization of brand residences has also contributed to making revenue sharing the suitable operating model to rapidly produce buildable land and new homes. Secondly, as reported by our results, this model is based on controlling public land, this does not mean it helps create reasonably priced homes. On the contrary, the KÖY and Maslak 1453 projects are examples of how revenue sharing helps maximize property income for the actors involved. When TOKİ allocates building rights, it adds value to the land given that this value is estimated on the so-called countdown principle. And yet the majority of the added land value goes to TOKİ's closest collaborator – Emlak Konut. Financial statements indeed show that the revenues paid by the property developer to use the land are superior to the land's selling price. This model does however enable the property developer to control his profit margins and shift the risk involved in the project to Emlak Konut. Finally, the State claims that it redistributes revenue from land privatizations into the urban economy. For example, this revenue goes into the recently created sovereign wealth fund used to finance transport megaprojects among other things. However the added value, which TOKİ gains contributes only to the development of brand residences when it could be used to finance social housing in Istanbul.

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Andrea Pődör*, Judit Nyiri Mizsei*

Urban Development Regarding Noise Pollution

Abstract

Environmental noise has a great impact on everyday life of the urban population. The paper presents recent legal regulation, which requires noise maps in a strategic planning framework to tackle this challenge. An overview of different to reduce noise in urban areas is given. It is assumed that crowdsourcing using decibel meter of mobile phones can be a good tool to detect places in an urban area with low and with high environmental noise. Therefore, test measurements were performed in a pilot area. The results show that different mobile phones can produce varying results, and the accuracy of the results is dependent on the software used on the mobile phone. Nevertheless, the achieved results can detect noisier and quieter places within a certain environment.

1. Introduction

Noise pollution is one of the dominant and growing environmental problems in urban areas. Noise affects everyday life, well-being, and it can even cause severe psychological problems (Pődör and Révész, 2014).

The general public perceives noise as one of the major environmental problems. According to the latest European Environmental Agency's (EEA) data, over 103 million people are exposed to road traffic noise levels above 55 dB Lden (Lden = day-evening-night sound level) and almost 24 million are exposed to noise levels above 65 dB Lden. Noise levels above 40 dB can influence well-being, with most people being affected at 50 dB and seriously affected at 55 dB. In Europe, at least 72 million inhabitants are exposed to road traffic noise levels greater than 50 dB L_{night} (night sound level – EEA, 2013).

According to the Environmental Noise Directive of the European Union 2002/49/EG (END) each agglomeration pursuant to article 7 – resembling municipalities with a population more than 250'000 – should create a noise map and these maps should be renewed every five years.

Due to the lack of financial resources, local authorities in Hungary are unable to fund the renewal of these maps. A potential alternative for updating the noise maps is crowdsourced data collected by citizens. Due to the increased availability of location-enabled smartphones with a range of digital sensors including sound recording, these data acquisition is promising.

The aim of our study is to investigate the possibilities of the usage of smartphones as a noise measurement device to reveal places where noise exposure is high.

* Óbuda University Alba Regia Technical Faculty, Institute of Geoinformatics, Székesfehérvár/Hungary.

One objective of the study is to approve the hypothesis of Santini et al. (2009) that different softwares produce diverging measurement data on the same equipment.

Another objective is to reveal that using the same software different devices produce different results, although in case of noisy places they measure higher decibel values.

2. Legal background

The Environmental Noise Directive of the European Union 2002/49/EG (END) gives detailed explanation about how and in which way a strategic noise map should be compiled.

According to END the most important indicators are, L_{day}, $L_{evening}$, L_{night} and L_{den} in preparing the strategic noise maps. All indicators are weighted long-term average sound levels as defined in ISO 1996-2:2017(https://www.iso.org). L_{den} is determined over the indicated period of 24 hours, L_{day} is representing twelve hours, $L_{evening}$ four hours and L_{night} is the aggregated and weighted result of eight hours.

The Hungarian Government Decree 280/2004 (X.20) in 2004 obliged all settlements with a population more than 100'000 to create a noise map and a plan to reduce noise pollution exceeding the EU Directive. All these maps should have been prepared by 2012 and there is an order to renew them every five years from 2010 onwards (Pődör and Révész, 2014). Only five settlements (out of in total 3'154 settlements) meet these requirements and can apply for financial funding for noise measurement.

In Hungary there are further relevant regulations, which are connected to environmental noise exposure:

- Joint Decree No. 27/2008. (3 Dec) KöM-EüM of the Ministry of Health and the Ministry of Environment on the establishment of noise and vibration limit values;
- Decree No. 93/2007. (18 Dec) KvVM of the Ministry of Environment and Water Management on the establishment method of noise emission limit values and the method of noise and vibration emission control;
- MSz 18150/1. Examination and evaluation of environmental noise;

3. Urban development issues concerning protection against noise pollution

Municipalities can legislate locally binding decrees, which will regulate the protection of the built environment. Building permit should be given, if an "Environmental impact assessment" is prepared and measures for reducing noise are planned before the construction.

3.1. Noise reduction through road planning, reorganisation of transport

The following measures can be applied to reduce noise by local municipalities:

- minimizing of road length between two sites;
- organisation of transport;
- road building technology;

- protection facilities;
- speed limit;
- support of public transport;
- road access restriction;
- parking limit;
- pedestrian zones;
- road surface;
- spatial planning: the main goal that noise pollution can be prevented as much as possible.

3.2. Protecting the built environment, various technical facilities can be used

The most typical technical facilities are noise barriers. Two main categories of noise barriers that can be applied:

- absorbing (railway);
- reflective (cheaper).

Other types of technical solutions of noise "barriers" are:

- afforestation (with a minimum width of 50m);
- full or partial covering of the roads.

In built environment the design process has a key role in noise reduction. During design process the following methods can be considered:

- closed building blocks, courtyards, creating quiet residential sites;
- balconies must be designed, so as to avoid unwanted sound reflection;
- the living room planning: the living room, preferably facing the more silent direction;
- in case of 2–3 storey residential building, the warehouse, service areas and commercial establishments can be arranged in front of the building or on the first floor.

The most well-known passive protection is window replacement with improved glass. By replacement of windows (for example with three-layered glasses) an enhanced noise reduction can be reached (Bragança & Patrício, 2005). These type of windows have a so-called advanced passive gravitational ventilation structure and thereby this technique provides adequate air circulation without the noise would increase. Another case of passive defence can be a closed high sound-proof glass wall or curtain wall placed in front of the buildings. It is also common that with sealing gaps the noise exposure can be reduced. Applying this method, 4–5 dB higher sound insulation can be achieved.

Before using any of the above mentioned methods, we should know the sites of the noisy places where these technique can be implemeted. To reveal noisy places we need to prepare a noise pollution map. While creating noise maps, we face two problems: these maps require

substantial financial resources and they are not compulsory in settlements under 100'000 inhabitants.

A potential alternative for updating noise maps is crowdsourced data collection by involving citizens. Due to increased availability of location-enabled smartphones with a bundle of digital sensors including sound recording, these data acquisition is promising.

4. Measurements of noise: case study

The usage of mobile phones for noise measurements was tested by several authors (Murphy and King, 2016; Miller et al., 2016; Maisonneuve et al., 2010; Garcia-Martí et al., 2014; Kardous and Shaw, 2015; Nold and Francis, 2017; Pődör et al., 2015), but it happened in lab environment without using professional sound level equipment. Therefore, we planned parallel measurements with mobile phones and professional sound level meters. In our case study a sound level meter and three devices parallel were investigated.

We mainly used our analyses when an organised noise measurement is not possible due to financial problems. A good alternative can be a measurement campaign by citizens. Although it is obvious that the results of these measurements cannot achieve the accuracy of a professional measurement, we think it can reveal noise pollutions on a reliable level.

Case Study: The measurements were made in Budapest, near to Corvin district, which can be found in the crossroads of the Üllői Road and József Boulevard. The József Boulevard and the Üllői Street are also double-lane cross-roads, so they are the biggest sources of noise in the area, while the turnover of the surrounding roads (Prater Street, Nap Street, Futó Street, Vajdahunyad Street) are negligible compared to the Boulevard and Üllői road. This junction is the busiest area of Budapest city. The poor quality of the pavement, the high number of passing buses and trams as well as the continuous violation of speed limits by car drivers increase the vehicle traffic noise (Figure 1).

Figure 1: Pilot area of Case Study (Source: OSM).

The noise meter applications use the built-in microphone of mobile devices and are able to measure noise volume in decibels (dB). It is important to note that built-in microphones are optimized to human voice (300–3400Hz, 40–60dB). The applications are not meant to replace scientific instrumentation. Depending on the device, we can experience differences in measurement. Devices utilizing AGC (Automatic Gain Control) will have critical measurement errors (Sound Meter User Guide).

We used three noise meter applications: Noise level meter, Sound level meter and Noise Watch – all of them can be downloaded to the mobile devices from the Internet free of charge.

In our case study there was only one collector team. They used three free downloadable applications (Noise Watch, Noise Meter, Sound Meter). The applications were installed on two different mobile devices. Parallel to the mobile devices, the collector team also used a high accurate noise meter equipment – Voltcraft SL-200. It was the same equipment, which was applied in several test measurements before. (Pődör and Révész, 2014). In this test, several parallel measurements were carried out. The detailed overview of the measurements can be found in Table 1.

Table 1: An overview about the measurement campaign in Case Study

Number of measurements of Case Study	**Date**	**Devices**	**Period**
1. measurement	16.11. 2015	Volcraft SL 200 Samsung A3 & Samsung Galaxy S4	weekday 17.00–19.00
2. measurement	22.11. 2015	Volcraft SL 200 Samsung A3 & Samsung Galaxy S4	weekend 10.00–12.00
3. measurement	18.03. 2016	Volcraft SL 200 Samsung A3 & HTC Desire 81	weekday 17.00–19.30
4. measurement	20.03. 2016	Volcraft SL 200 Samsung A3 & HTC Desire 81	weekend 9.00–11.30

At each location, we measured parallel with the sound level meter and the two devices using Noise Meter software, than we repeated the measurements using Sound level meter and Noise Watch. The measurements were repeated in the same manner in March, with Samsung A3 phone and the Voltcraft device, however, the former S4 phone was changed to phone HTC Desire 81. In this case, the same application was installed on the phones. The measurement's results were recorded manually on a template, where we identified the ID of the measurement point and the result of the measurements.

5. Processing and analysis of data

Basic statistical analyses were performed on the data. Detailed results can be seen in Table 2 and Table 3. We indicated the results of measurements during peak hours, when noise pollution is high, and repeated the measurements when there was no traffic in the weekends.

Table 2: Measurement statistics in March (peak and off-peak hours)

Equipment and software	Correlation to Voltcraft		Mean		Standard Deviation		Range	
	peak	off-peak	peak	off-peak	peak	off-peak	peak	off-peak
A3 Noise Watch	0,96	0,95	54,38	41,43	1,785	1,31	36,6	25
A3 Noise meter	0,89	0,94	57,72	43,88	1,32	1,26	24,6	24,7
A3 Sound level	0,85	0,96	66,27	43,78	1,52	1,40	30	22
HTC Noise Watch	0,94	0,96	58,31	42,39	2,06	1,34	43	23
HTC Noise meter	0,93	0,94	60,39	45,07	1,63	1,30	34,5	22,7
HTC Sound level	0,89	0,95	69,92	45,46	1,49	1,43	32	23

Table 3: Measurement statistics in November peak and off-peak hours

Equipment and software	Correlation to Voltcraft		Mean		Standard Deviation		Range	
	peak	off-peak	peak	off-peak	peak	off-peak	peak	off-peak
A3 Noise Watch	0,955	0,95	54,05	41,43	1,95	1,31	39	25
A3 Noise meter	0,85	0,94	57,66	43,88	1,41	1,26	26,5	24,7
A3 Sound level	0,83	0,96	66,88	43,78	1,48	1,39	27	22
S4 Noise Watch	0,93	0,96	58,08	42,39	2,05	1,34	43	23
S4 Noise meter	0,86	0.94	60,67	45,07	1,66	1,30	36,4	22,7
S4 Sound level	0,84	0,95	71,05	45,46	1,56	1,43	32	23

Generally in our case study the correlation rates were quite high The most feasible explanation behind of this is the length of these measurements were longer and the simultaneous measurement could be better monitored for two phones and the sound level meter device. In addition, it could be approved that different noise measurement applications uploaded to the test telephones have different accuracy. Some mobile phones are working with a certain application better than with other ones. Also during off-peak hours, we could measure

lower dB values than during peak or rush hours. It is also indicated by the range values which are in the case of rush hours are higher (Table 2 and Table 3).

The results showed that HTC phone produced the highest correlation to the professional equipment (see Table 2 and Table 3) and NoiseWatch generated the best values. Although we should admit that there is no significant difference between the results.

For map compilation, we used inverse distance weighted interpolation method. The map clearly indicates the busiest streets, which are most polluted with noise and it is also reveals that houses behaves as noise barriers. As on the streets we measured approximately around 70 dB and behind the houses with 20 dB less (Figure 2).

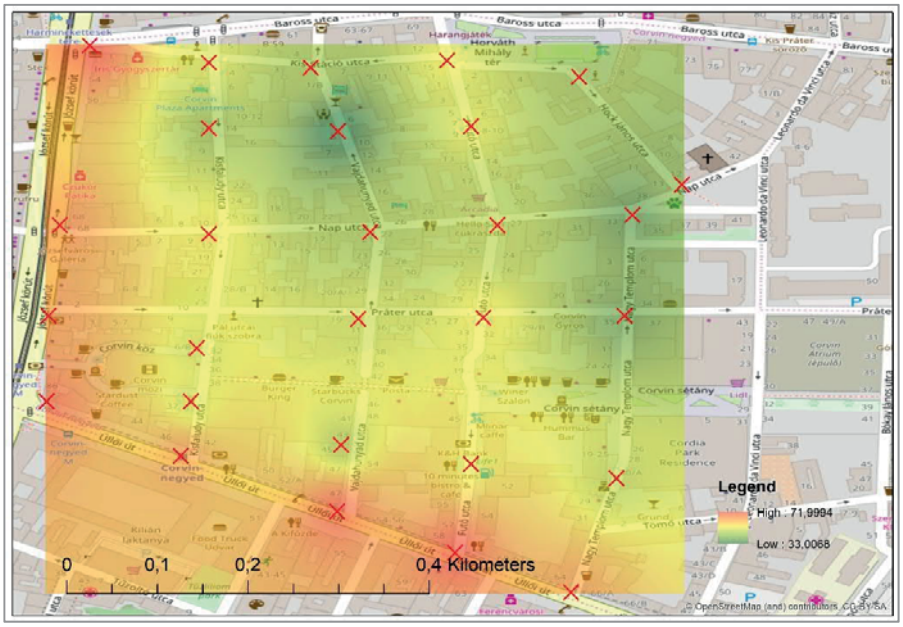

Figure 2: Interpolated noise map of the case study area (Source: OSM).

6. Conclusions

Environmental noise affects everyday life and it may mean a constant risk to our health within urban environments (EEA, 2013). Therefore, spatial planning should handle and consider that problem. To detect urban areas with high risk of environmental noise, crowdsource noise mapping can be employed.

In our study, crowdsource noise measurements were used to investigate whether it can be applicable for detecting noisy areas in urban environments.

Our results show that different mobile phones produce different dB values depending on the quality of their microphones. The hypothesis that on the same equipment different noise meter applications produce diverging measurement data (Santini et al., 2009) was also confirmed.

Although measured decibel values can differ because of the different devices and software, they can at the same places definitely distinguish between high and low values.

As we revealed in our case study, mobile phones and noise measurement software can be applied to identify problematic areas where a professional noise measurement can be performed afterwards.

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Torge Steensen*, Markus Schaffert*

OpenStreetMap and Sentinel-2 Data: Opportunities and Limits of Merging Two Open Data Sources

A multi-data-approach for cloud shadow reduction

Volunteered geographic information and satellite-based images have often been used to generate knowledge about the earth's surface and the natural and anthropogenic processes thereupon. Despite their many advantages, both information sources have inherent limitations and have often been considered separately. In this paper, we are merging the advantages of both approaches by presenting a workflow for combining OSM data with a high level of thematic accuracy but a lack in completeness with Sentinel-2 data of high coverage but lack of surface recognition due to atmospheric cloud shadows. Our approach creates a symbiosis of the two data sources and shows promising results for the enhancement of OSM as well as orbital data.

1. Introduction

A constant data stream from voluntary mapping initiatives like OpenStreetMap (OSM) and government organised earth observation programmes like Copernicus allows an ever-increasing availability of land cover and land use data (LULC). These programs follow the open data policy, which allows a largely free use of the data sets.

However, data sets from these programmes have advantages and disadvantages. Knowledge of these is important for their application. While in countries like Germany, there is official geo data at hand, in other regions of the world OSM might be the only available data source informing about small geometric structures, like streets. However, the data's quality differs over space and time depending on the number and skills of the contributing mappers (Neis et al., 2013).

Earth observation programmes, on the other hand, are monitoring from space allowing capturing a vast area at once. Frequent capture of the same region by the same satellite allows change detection, a feature that can be combined with the temporal offset between the data sets to estimate a change-per-time value (Schaffert et al., 2016; Schaffert and Steensen, 2017). However, satellite observations are restricted, among others, by the time the satellite covers the desired area and the size of the objects on the ground that can be separated in the data.

Furthermore, the geometric constellations between sun, earth and satellite are crucial parameters for the image acquisition as clouds might obscure parts of the earth's surface. In addition, cloud shadows can be generated in the satellite's line of sight but away from

* Leibniz Universität Hannover, Geodetic Institute/Germany.

atmospheric clouds. Due to missing electromagnetic information at that point, we cannot necessarily produce a clear picture and identify the underlying structure – depending on the cloud's thickness (Figure 1 & 2).

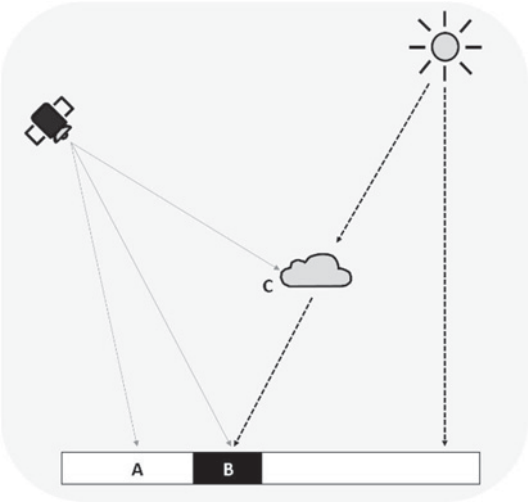

Figure 1: Geometric constellations between satellite, sun and the earth. From the point of the satellite, three scenarios are visible: Illuminated surface of the earth (A), the earth's surface in the cloud shadow (B) and the cloud itself (C).

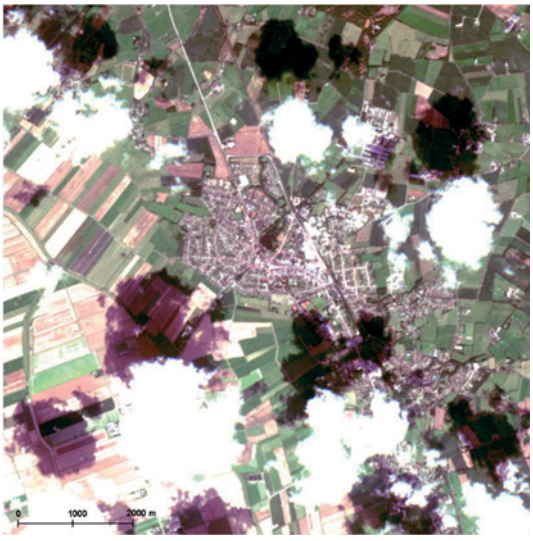

Figure 2: Clouds, cloud shadows and the illuminated earth surface as an example from a Sentinel-2 image.

In this paper, we are presenting a suggestion for targeting these cloud shadows and are developing a first-hand approach for deriving valuable information, even if the satellite data set is sparse. Our methods are contextual analysis of the electromagnetically illuminated

surrounding areas based on Sentinel-2 data, a satellite mission by the European Space Agency that started in 2015 as part of the Copernicus Programme, and in measuring the surface multispectrally with a geometric resolution of up to 10m (Wang and Atkinson, 2018) in combination with OSM data from the clouded region and its vicinity. With the help of supervised and unsupervised classifications, we are able to decipher obscured structures and, hence, are able to produce an updated inventory of land use and cover data. With this, we like to promote the usage of Copernicus as well as OSM data, as well as their symbiosis possibilities.

2. Data & methods

2.1. Volunteered geographic information (VGI)

The term VGI outlines spatial data that is gathered, assembled and disseminated by volunteers. These volunteers are often amateurs and the accuracy of their work might differ. "But collectively, they represent a dramatic innovation that will certainly have profound impacts on geographic information systems (GIS) and more generally on the discipline of geography and its relationship to the general public" (Goodchild, 2007). Among other benefits, such user-generated data incorporate local knowledge. Knowledge of this kind might contribute to complement maps generated by distant government agency's (Elwood, 2008) or even support dynamic mapping in time sensitive applications like disaster management (Horita et al., 2013).

OpenStreetMap (OSM)

OSM is probably the most popular of several VGI initiatives. It was introduced in 2004 to generate a free editable world map. It is based on user-generated vector geo data sets that are distributed online and are freely available to all users. The included objects' attributes are described using tags that represent the thematic properties. Tags are saved as key value pairs where the key, e.g. "land use", describes the type of the described area and the value, e.g. "land use = meadow", further specifies the key (OpenStreetMap Wiki, 2018).

There are multiple methods to gather data for OSM, including mapping through GNSS[1] receivers, e.g. from smartphones, or digitizing objects from aerial images. Every registered user can record and change data. These liberties are a main pull for the popularity of the OSM project that is resembled in its large community. On the other hand, the lack of mandatory regulations for data capture leads to changing data quality showing a spatial and temporal pattern that can be explained by the number and the experience of active contributors (Neis et al., 2013). Generally, urban regions are mapped better than rural ones with more detailed areas allowing for a finer-scaled analysis. Divergent data quality is seen as a main hurdle for the intensified usage of OSM data in practice and research (Antoniou and Skopeliti, 2015). It is visible in the completeness and thematic accuracy of a mapped region

[1] The Unites States' Global Positioning System (GPS) is one example for a GNSS (Global Navigation Satellite System).

(cf. Figure 3), which are termed the most important parameters for the OSM quality regarding land use and land cover (Jokar Arsanjani et al., 2015).

Figure 3: Lacking buildings in OSM: The orange objects represent all buildings in this area that are currently available in OSM. The aerial photo in the background reveals the lack of completeness. The Map, including the ArcGIS online basemap (Imagery), was created using ArcGIS software by Esri.[2]

2.2. Satellite Data

Satellite-based measurements consist of electromagnetic waves of different wavelengths and intensities. The atmosphere has varying contents of water, ranging between 0cm at higher latitudes and 6cm and above around the equator with seasonal changes (Fleagle and Businger, 1981). The unit centimetre represents a meteorological concept describing the height of the water level if all the vapour was compressed into liquid water.

An everyday phenomenon, arising directly from the height of the water vapour level in the atmosphere in combination with the local temperature, is the presence of atmospheric clouds (Fleagle and Businger, 1981). Commonly spoken, human eyes, which operate in the visible spectrum between about 380nm and 720nm of wavelengths, cannot penetrate a thick layer of clouds and see what is lying underneath. The same is true for satellites in several ranges of spectral bands, describing the area of the electromagnetic spectrum they are operating on. Water vapour is the strongest inhibitor for electromagnetic information to pass

[2] For Information on licensing requirements for scientific work see https://support.esri.com/en/technical-article/000012040.

the atmosphere and occurs over a wide range of the electromagnetic spectrum, along with carbon dioxide, ozone or methane (Figure 4).

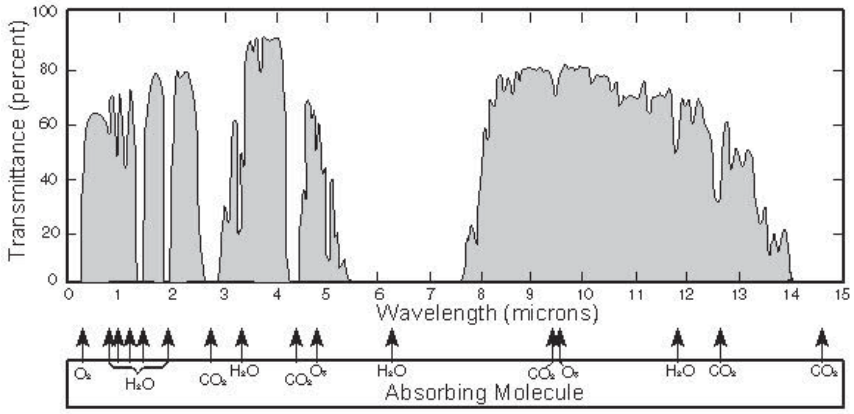

Figure 4: Characteristics of atmospheric spectral transmittance (https://no.wikipedia.org/wiki/Fil:Atmosfaerisk_spredning.gif). The absorbing molecules seen in the box at the bottom are responsible for the lack of total transmittance at that spectral region. Water vapour (H_2O) is one of the strongest inhibitors.

Similarly, this inhibition is also true for the downwelling electromagnetic radiation, i.e. the solar energy arriving at the earth's surface. Some regions of the earth are not continuously illuminated directly by it and shadows occur. Most notably are the cloud shadows, observable with the naked eye.

Sentinel-2

The Sentinel mission, which is carried out by the European Space Agency within the Copernicus programme, started in 2014 and currently comprises six missions with different spectral resolutions from the ultraviolet over the visible, thermal to the microwave parts of the electromagnetic spectrum. Sentinel-2, started in 2015, is designed for the monitoring of land cover with imaging bands in the visible and infrared regions. Sentinel-2 has a spatial resolution of up to 10m and a temporal frequency between a few hours to a couple of days, depending on the geographic location with higher frequencies at higher latitudes (European Space Agency, 2015). As the acquiring methodology does not change over time, Sentinel 2 allows change detection measurements.

A spatial resolution of 10m is comparably precise for satellite-based measurements but cannot match more detailed ground-based analyses. The temporal frequency causes the resulting data products to lack in temporal coherence. Furthermore, as satellite data work with electromagnetic energy that initially originated at the sun, the data can show gaps where solar illumination is incomplete, e.g. cloud or building shadows. The radiometric value is also depending on other influencing factors like atmospheric aerosols that can alter the received information. There are different approaches to mitigate such effects but, depending

on the thickness of the interfering layer, these algorithms can prove too weak (e.g. Wu et al., 2016; Shahtahmassebi et al., 2013; Richter and Müller, 2005).

2.3. Concatenation of OSM and Sentinel-2 Data Sets

Taking into account the advantages and disadvantages of both acquisition systems as described above, we can derive an approach to increase the completeness of the OSM data set while also increasing the surface information of the Sentinel-2 data by eliminating the cloud shadows. Generally speaking, there are twelve scenarios to be considered for every location (a location as an object like a meadow or a lake) as seen in Table 1. Here, the quality of the OSM data resembles their thematic accuracy and, for simplicity, the clouds in the Sentinel-2 images are spectrally homogenous allowing light to penetrate and to illuminate the surface homogeneously but in a reduced manner.

Table 1: Possible scenarios for OSM – Sentinel-2 comparisons. OSM data can exist on one of three stages [1 to 3], while Sentinel-2 data can be described as being in stages [A through D]. This results in a total of twelve possible scenarios for each location [e.g. 1A, 3C or 2B]

	OSM Data
1	existing in good quality
2	existing in questionable quality
3	not existing

	Sentinel-2 Data
A	existing, free of clouds
B	existing, in cloud shadow
C	existing, under clouds
D	not existing

Out of these scenarios, options 1A and 3D represent measurements resembling complete or absent coverage in both data sets. A further refinement is not in the scope of this article. Similarly, in the combination, where local OSM data exists but the region has not been covered by Sentinel-2 data (1D and 2D), an improvement based on the Sentinel-2 data is not possible. Furthermore, we are only focusing on Sentinel-2 data improvements in the cloud shadows and not in those regions obscured by clouds, eliminating scenarios 1C, 2C and 3C. Our approach needs OSM data of good thematic accuracy as an input. This is a prerequisite as OSM data is going to be used as an input for classifying the Sentinel-2 data. Therefore, scenarios with OSM of questionable quality (2A, 2B, 2C and 2D) are beyond the scope of our work as well. Previous work to use good OSM data to enhance Sentinel-2 scenes in the cloud shadows and, in retrospect, to complete gaps in the OSM data set has not been done.[3] Our focus, hence, lies in options 1B, 3A and 3B.

[3] Johnson and Iisuka (2016) combine OSM and Landsat data. Landsat is the longest-running satellite-based earth observation mission, with technical features different of those characterizing the Sentinel programme (e.g. a lower spatial resolution).

Scenario 1B describes a location, where a piece of OSM information exists. This location is also covered by Sentinel-2 imagery outside the clouded but inside the shaded regions.

It is important to note that, while this location features a good quality OSM coverage, other locations within the region might not show this.

In scenario 3A, we have a location, for example a meadow that is covered by Sentinel-2 data and is located in the sun. OSM data, however, show no information about this meadow, even though another meadow close to this one might be included in OSM.

Finally, scenario 3B is similar to 1B but, here, our location is in a shadow in the Sentinel-2 data but OSM does not cover it. However, a similar location close by might be in OSM.

2.4. Case Study: Bredstedt

To show our approach, we selected the city of Bredstedt in the north of Germany (Figure 5) because we have good Sentinel-2 data sets with individual clouds and their respective shadows as well as OSM data of good thematic accuracy but with significant gaps (Figure 6).

Figure 5: The Bredstedt region in Northern Germany.
Map tiles by Stamen Design (CC BY 3.0). Data by OSM (ODbL).

3. Illustration of the proposed workflow

A common way to identify thematic regions in satellite imagery is by means of a classification. There are, generally speaking, two types of classifications – the unsupervised and the supervised one. In both approaches, the spectral signature of the satellite data is evaluated and compared for each pixel. Similar signatures are clustered and assigned a class, e.g. grassland. In the unsupervised classification, on the one hand, this clustering happens automatically without predefined classes. The supervised classification, on the other hand, utilises user-selected classes with spectral signatures known to represent certain objects. This way is more accurate but also more time-intensive as the users need to manually select the regions of interest (RoI) of the satellite image representing the classes.

Figure 6: The Bredstedt administration (shaded grey) and LULC-Objects from OSM in its vicinity on a backdrop of an aerial photograph. A variety of different objects has been registered but there is no total coverage available. RED = urban and military areas, GREEN = forests, YELLOW = agricultural land and marshes. The Map, including the ArcGIS online basemap (Imagery), was created using ArcGIS software by Esri.[4]

3.1. Scenario 3A

OSM offers the option to enhance this by taking the available LULC-objects in the OSM data set and selecting them as input for the user-selected RoIs. A supervised classification will then take the spectral signatures of those regions and classify the other regions with similar properties as the same type of region. This means that a meadow in OSM exists in some places of the region, but has no completeness of 100%. We take the spectral information from the Sentinel-2 data of the location of the RoI as defined by the existing OSM meadow and assign all regions of similar spectral information in the Sentinel-2 data, i.e. all other meadows, and create a new raster layer, which will include information of all available meadows. This approach follows an idea outlined by Johnson and Iisuka (2016) for Landsat and adjust it to Sentinel-2 data. Additionally, this will later be used to increase the completeness of LULC data in the OSM.

3.2. Scenarios 1B and 3B

A similar approach can be taken in cloud shadows. Spectral information is scarce due to the light attenuation, but an added data source, e.g. OSM, helps to improve the knowledge of shaded areas (scenario 1B). Good quality OSM data of, for instance, farmland in Sentinel-2 shaded regions provides areas of that land cover. All OSM covered regions of this type in

4 For Information on licensing requirements for scientific work see https://support.esri.com/en/technical-article/000012040.

the shade can, thus, be assigned the label farmland in the Sentinel-2 data to improve their surface information.

We can also use a similar approach as we did in scenario 3A in the shaded regions by comparing the spectral signatures of OSM defined regions to undefined regions (scenario 3B). This way, we further enhance the completeness of the new raster layer in the shadow while, simultaneously, creating new information for the Sentinel-2 data interpretation.

These approaches have been done in comparison to a regular, unsupervised classification to show the performance differences (Figure 7).

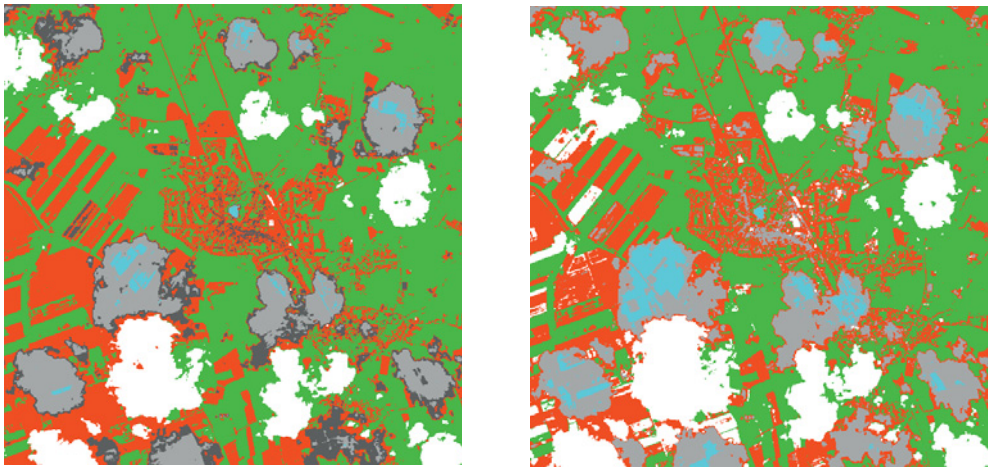

Figure 7: Two possibilities for classifications of the Sentinel-2 image from Figure 2.

The image on the left-hand side of Figure 7 (A) shows the regular unsupervised classification, whereas on the right-hand side (B) was done using our approach. The unsupervised classification was implemented using K-means, one of the most frequently used algorithms for this kind of classification. In both cases, the colours are as follows: White-Clouds, Green-Pastures, Grey-Shaded Pastures, Red-Agriculture and Settlements, Blue-Shaded Agriculture and Pastures. The automatic classification in (A) added another class (dark grey) for the outer edges of the shade. Our approach omitted that. Differences in the shade are distinct between (A) and (B) with (B) resembling the original image from Figure 2 better.

3.3. From a remote sensing environment to OSM

Established remote sensing software, like ENVI or ERDAS Imagine, can be applied for preforming the classification as proposed above. The same software packages allow for converting the classification results, which are stored in an additional raster layer, to a vector-based format. As OSM data is vector data, the results can be integrated into the OSM database: Desktop applications like JOSM (Java OpenStreetMap Editor) or Potlach 2 enable to load external vector data, e.g. a shape file (.shp), and to integrate it into the OSM map. The software packages in charge for the classification, the vectorization and the upload to the OSM platform allow automation. Thus, the whole workflow can be run automatically.

While for evaluation purposes uploading third party data manually to OSM might be the better choice, additionally an automated import by now becomes possible, e.g. supporting rapid mapping approaches for time sensitive applications. Furthermore, the completeness of OSM data base could be enhanced. This would support filling OSM´s lack of spatial completeness regarding LULC-data.

Figure 8 shows the essential steps of the respective workflow, starting from Sentinel-2 data (on the left) and the input of OSM data serving as RoIs. In our approach, we used data marked as "land use" and "natural", which are the main tags for land use in OSM. The classification results in a further raster layer which afterwards is vectorised to support the potential upload to OSM.

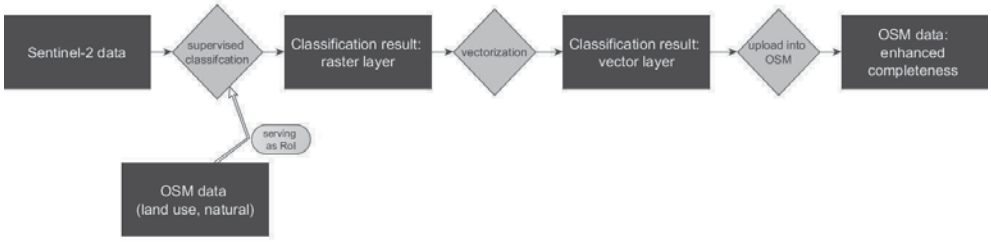

Figure 8: Concatenation of OSM and Sentinel-2 Data Sets: workflow.

4. Discussion and outlook

We have described an approach to use OSM data of good quality with existing, large-scale Sentinel-2 data sets to improve each's quality and completeness. Instead of an unsupervised classification, a supervised classification has been applied leading to better classification results. By using LULC objects from OSM, the automation of the approach is still given resulting in products in a timely fashion and of good quality.

A visual evaluation of the preciseness of the approach proposed has been done in Figure 7. The sharpness of the edges supports our method and visually there is no disagreement between the original approach and the more complex, manual analysis.

Figure 7 also shows discontinuities along the edge of the cloud. This is caused by the inhomogeneities of the atmospheric disturbances. One of our assumptions was that the cloud was spectrally homogenous. However, especially at the edges, this assumption will fail. Depending on the shape of the cloud and its particle sizes the appearing edge will in- or decrease in size.

With the OSM-based approach, a filling of this gap is not possible. However, based on shapes and lines, it is possible to outline streets, fields and other large bodies that could stretch across the gap. A further detailed analysis of these areas will be part of a future project.

The evaluation of the thematic accuracy is a prerequisite to use LULC objects from the OSM as ROIs in the approach specified here. This has been done by a visual comparison

with aerial images and is, hence, not yet automated. To use Sentinel-2 as well as OSM data as a common base for time sensitive applications, a more thorough automation of the entire workflow is needed. In the future, two different approaches should be integrated in the proposed workflow to reach a maximum automation.

Extrinsic quality assessments estimate the quality of OSM data sets based on a comparison with a "reliable" secondary data set. Governmental data are a common source for this, whose quality in terms of assessment criteria is known, and are taken as "ground truth". Dorn et al (2015) and Retat & Schaffert (2018), among others, have shown comparisons between LULC objects based on OSM data and the German federal ATKIS Base DLM (Digital Landscape Model) by using GIS, which allows an automation of the necessary steps. While the Base DLM has a total coverage for Germany, comparable data sets for global contexts are not necessarily present. These gaps could be filled by intrinsic approaches for quality estimation up to a certain degree, which derive quality parameters from OSM user information. These meta information is, just like the data itself, free to use. It is assumed that the data quality improves in regions with a high number of active mappers and/or users with local knowledge and/or users with a long history of previous posts (Barron et al., 2013; Sehra et al., 2017).

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Markus Schaffert*, Volker Höcht**

Municipal Population Data for Rural Development in Germany

Opportunities, limits and GIS-based approaches

Abstract

Germany´s statistical offices provide population data for administrative units like counties or municipalities, with the latter ones being the smallest administrative unit in Germany. As these data sets represent average numbers for the respective administrative unit, they do not include information on intra-urban areas like neighbourhoods or residential blocks.

Instead, each German municipality keeps a population register that could fill this gap. However, this data source is often neglected as it is not "ready-to-use" for spatial planning. Its processing is costly and requires know-how that employees of public authorities in rural Germany often lack.

This paper seeks to motivate both, scientists as well as public authorities in Germany to make better use of population data from municipal registers. Furthermore, it aims to give international readers inside knowledge of data-related challenges faced by rural development, local planning and research on small-scale demographic change in Germany.

Case studies from rural areas illustrate the advantages gained from analysing municipal population data when using Geographic Information Systems (GIS).

1. Introduction

In the coming decades, Germany's population structure and size are likely to change significantly. Ageing and population decline are dominant trends driving this development: the population is expected to fall from about 80.8 million (2013) to 67.6–73.1 million by 2060 – according to Germany's Federal Statistical Office (destatis, 2017).[1] Moreover, the number of inhabitants aged 65 years or more is predicted to increase by more than one third in the same period.

One of the core challenges for planning demographic change is its spatial variability. Currently, population-wise shrinking areas in rural Germany contrast with growing major cities. However, this general assessment only partly addresses the challenge of spatial variability since intra-urban dynamics also need to be taken into account. Demographic developments

* Land and Real Estate Management, Geodätisches Institut, Leibniz Universität Hannover/Germany.

** Anhalt University of Applied Sciences, Fachbereich 3, Dessau/Germany.

1 The projected population number for 2060 offers a variation due to differing assumptions about the future delevopment of net-migration, life expactancy and birthrate.

of a certain municipality (neighbourhood, residential block etc.) can differ significantly from those of neighbouring towns (neighbourhoods, residential blocks etc.). These patterns were observed in both, urban (cf. Schmidt, 2008) as well as rural parts of Germany (cf. Gans and Schmitz-Veltin, 2005) showing a smale-scale coexistence of shrinkage, stagnation and growth.

For adequately dealing with these patterns highly resoluted and up-to-date population data is needed. Data sets that are independent of administrative boundaries represent an additional advantage, since demographic change does not stop at city limits.

2. Population data sets for rural development in Germany

Germany's statistical offices – operated by both, the individual federal states as well as the national level – provide data on various population characteristics and guarantee its quality. These data sets are often used for planning in rural areas, because they are usually free of cost and provided in common interchange formats. Furthermore, they use the same methodology within each state, enabling comparisons between communes (Haußmann and Schmitz-Veltin, 2011).

Strategies for rural development with a supra-municipal or regional approach as proposed by ILEK or LEADER concepts frequently apply these data sets for SWOT analyses.[2] Moreover, even control mechanisms designed for intra-urban purposes refer to them. Mechanisms of this kind have been developed by some federal states to adjust funding for infrastructure towards demographic change. In Lower Saxony's *Zukunfts-Check* (Future Check) for funding sport facilities or Saxony-Anhalts *Demografiecheck* (Demography Check) for daycare, applying municipalities can evaluate future needs referring to this data source (LSBNS, 2011; IBSA, 2017). In addition, both the Future and the Demography Check allow the incorporation of data generated by the Bertelsmann foundation within its programme *Wegweiser Kommune* (Community Guide). It offers demographic products like retrospective analyses and population projections that are well-tailored to the target group "municipality". Still, official data sets generated by Germany's statistical offices largely serve as the fundamental basis of these products (Bertelsmann Stiftung, 2017).

However, demographic data sets from statistical offices are aggregated for entire municipalities or higher administrative units and, therefore, do not represent the spatial level that is sometimes required for decision-making (Haußmann and Schmitz-Veltin, 2011). Municipalities need precise spatial information to answer questions such as "where are single-family houses located that are occupied by only one or two elderly people?" or "which neighbourhoods feature a particularly high number of vacant buildings?". Data sets that solely provide information for municipalities as a whole do not address such questions accurately.

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[2] LEADER (Liaison entre actions de développement de l'économie rurale) is an EU initiative supporting rural development. Integriertes ländliches Entwicklungskonzept (ILEK) is a German funding program for rural development. SWOT: Strengths, Weaknesses, Opportunities, and Threats.

The population register of Germany's municipalities (*Melderegister*) represents another data source, which is acknowledged by *Zukunfts-Check*, but not mentioned by *Demografiecheck*. A control mechanism for sewage infrastructure in the state of Brandenburg (*Demografie-Check für Abwasser-Infrastruktur*) encourages the use of this very data set for describing the current population structure (Koziol et al., 2015). In the following, we describe the municipal population register in detail since it provides significant benefits for smale-scale studies.

3. Population data from the municipal registers

The Framework Registration Act (*Melderechtsrahmengesetz)* obliges citizens to register or deregister in case they move into or out of a house or flat. Local authorities in Germany keep population registers in order to prove their citizens' identity and place of residence. With more than 11'000 municipalities and a high number of registers, Germany differs significantly from countries like Norway or Sweden keeping one single, centralized population register (Scholz and Kreyenfeld, 2017).

German population registers contain the following attributes:[3]

1. family names, 2. previous names, 3. first names, 4. doctoral degree, 5. religious names / artist names, 6. day and place of birth, 7. gender, 8. (dropped)[4], 9. legal representatives' first and family names, doctoral degree, address, day of birth, day of death, 10. citizenship, 11. legal affiliation to a religious group, 12. current and past addresses, main and secondary residence, in case of immigration from abroad: the last previous address inland, 13. day of entry and departure, 14. marital status, in case of married couples or life partners: additionally day and place of marriage or the founding of the civil partnership, 15. spouse or partner (first and family names, doctoral degree, day birth, address, day of death), 16. minor children (first and family names, day of birth, date of death), 17. issuing authority, date, period of validity and serial number of the identity card / passport, 18. transmission blocks[5], 19. day and place of death.

These attributes describe for instance a resident's age or gender, residence status (main or secondary residence), and nationality (migration background). As all attributes are stored together with the resident's home address, population registers even allow for spatially non-aggregated analyses. In addition, current as well as previous addresses can provide insights on spatial migration patterns (Höcht, 2016). This makes municipal population registers a data source of significance for spatial planning. However, expert software supporting the

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3 The Framework Registration Act, Section 2 (1) determines mandatory attributes that have to be captured in the registration process.

4 An attribute (employed/unemployed) formerly listed in the Framework Registration Act, which storage is not mandatory any more.

5 Transmission blocks (*Übermittlungssperren*): According to the Federal Citizens' Registration Act (*Bundesmeldegesetz*) citizens have a right to object to the transmission of data to specific target groups (e.g. political parties).

registration process and ensuring its legally compliant implementation usually do not offer functionality demanded by planners.

Several approaches using GIS have been applied to fully use the potential offered by this data set.[6] In essence, they employ municipal population data by exporting it from the registration software and subsequently process it by GIS software. Export files from registration software packages are usually structured in two different tables: On the one hand, the so-called "active list" documents currently registered inhabitants. On the other hand, the "change list" stores information on migration into, out of and within the respective municipality as well as births, deaths, marriages and other registered events.

Processing the population register requires a significant amount of personnel and/or financial resources and expert knowledge. The latter includes both, experience with the use of GIS as well as familiarity with legal regulations. Since population registers contain data on individuals, analytical work must consider privacy concerns. Small municipalities that face financial and staffing constraints are usually unable to meet these requirements. Therefore, population registers are seldom used systematically in planning activities of rural municipalities. The situation is different in large cities able to afford statistical departments with trained personnel and a legally legitimated framework for using the register. This assumption is based on the authors' consulting experience with more than 60 municipalities located in rural parts of Bavaria, Saxony-Anhalt, Hesse, Baden-Württemberg and Lower-Saxony. German municipal statisticians share this assumption by arguing that the systematic use of the population register for planning is not well established in cities below 50'000 inhabitants (cf. Haußmann, 2012).[7]

4. Municipal population register in planning practice. GIS-based approaches

As previously stated, population registers record demographic characteristics of all citizens registered in a municipality. Since these characteristics are stored together with the respective address, they can be processed by GIS software.

As a first step the address is transformed into real-world coordinates ("geocoding", Goldberg, 2006). Subsequently, all attributes kept in the register are available for spatial analyses. In Figure 1, for instance, we utilized attributes stored in the register's change list to calculate spatial patterns of net migration in a north Bavarian municipality. In this case, the municipality's boroughs present heterogeneous migration trends: While the share of some boroughs' inhabitants reached double-digit growth between 2000 and 2010, most boroughs lost population due to out-migration.

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6 Schaffert and Höcht (2018) provide an overview of respective approaches applied in rural municipalites and regions of Germany.

7 This is because the Data Protection Acts of the federal states allow the elicitation of municipal statistics only in public authorities with a separate statistical unit (*Trennung von Statistik und Verwaltungsvollzug*) as it is mainly provided by major cities (Haußmann, 2012: 76, 79).

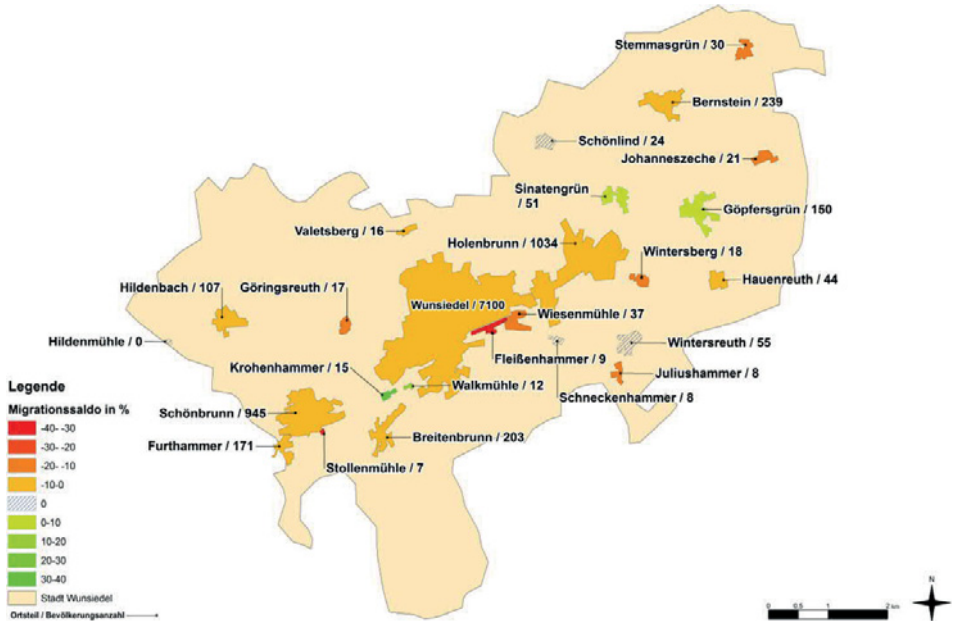

Figure 1: Small scale net migration (Koppers et al., 2012).

Depending on the respective example, raster cells or catchment areas might be more suitable to represent a certain demographic characteristic than boroughs. A major benefit of a GIS-based approach employing municipal data is its flexibility for intra-urban studies: Instead of depending on statistical areas defined by third parties (e.g. administrative boundaries), local use cases might determine the level of spatial aggregation. Furthermore, spatial aggregations are also a prerequisite to meet privacy criteria. As these criteria depend on the specific case, this flexibility offers another key benefit.

Figure 2 maps vacancy risks of residential buildings. This study has been carried out in a municipality located in the same rural Bavarian region characterized by population decline and aging. It is based on a simple model because it focuses solely on the indicator "life expectancy of the youngest resident" which was calculated by using the population register and life expectancy figures from the Bavarian statistical office. In this case, we computed spatial density patterns representing "hot-spots" of the aforementioned topic. The density map visualizes areas with need for action. Furthermore, this kind of visualisation supports privacy regulations because the disclosure of demographic characteristics appears blurred. Maps of this kind could serve as a working base to support measures like village renewal[8] or other programs fostering rural development. Since empty residential buildings are a core challenge for many rural settlements in Germany, mapping vacancy risk is frequently applied

8 Village renewal is a German funding program, which supports rural municipalities to improve or sustain living conditions. Since it demands the participation of the public, communicating relevant information in a way that protects data privacy remains a challenge.

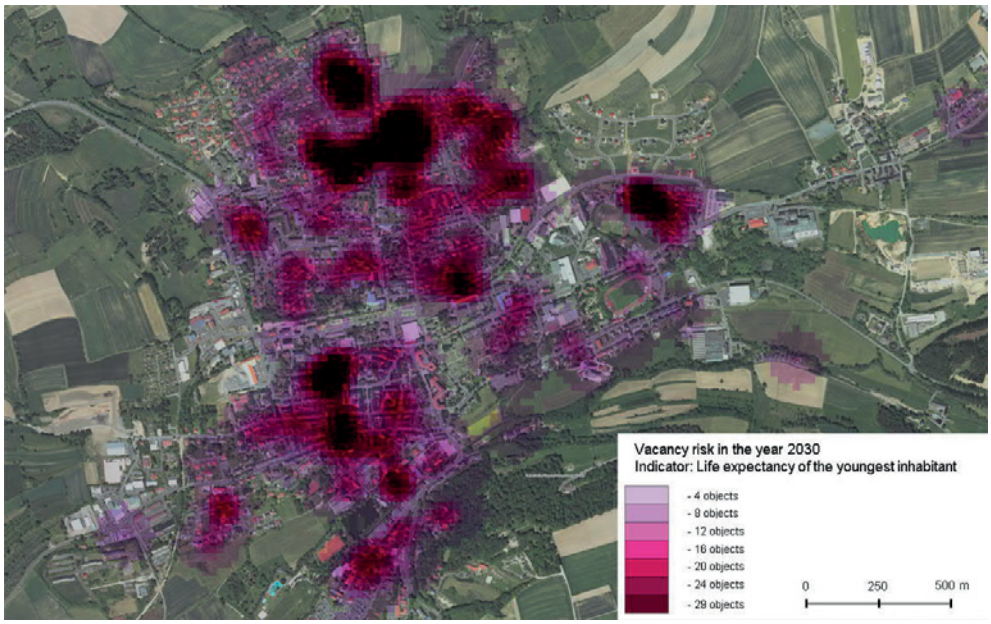

Figure 2: "Hot spots" of vacancy risks (Höcht 2016).

in the village renewal process. Still, relevant data is often gathered by interviews, questionnaires or costly site visits (Schaffert, 2011). An approach based on population registers and GIS might reduce these costs since it allows for automated detection of empty houses and vacancy risks. Furthermore, constant monitoring of intra-urban demographic developments becomes feasible even for small public authorities (Höcht, 2016). The potential of this approach remains far from being exhausted. By offering a centralized service Lower Saxony's *Baulücken- und Leerstanskataster* (cadastre on vacant lots and empty houses) could serve as a role model in Germany. Municipalities can participate by sharing export files from their population register and paying an annual fee (Kleinwächter, 2014). The data is processed on behalf of the corresponding municipalities in an automated, centralized approach by the mapping agency of the federal state. While it would be too early to fully evaluate this new service, it is likely to significantly reduce manual labour.

Accessibility analyses provide a further example of the benefits from processing geo-coded register data by GIS. Accessibility of care facilities for instance remains a central concern for securing equivalent living conditions.[9] The value of this kind of analyses can be improved by integrating local demographic information. For example, register data supports accessibility analyses customized for certain age groups and the services they require such as schools, kindergartens or sports facilities (Schwarze, 2008). Figure 3 clarifies this idea: Based on locations of certain facilities (here: secondary schools) reachability (here: the distance to the

9 Establishing equivalent living conditions (*gleichwertige Lebensverhältnisse*) throughout the country and its sub-regions is a policy aim formulated in section 2 (1) of the German Regional Planning Act. Germany's constitution (article 72) also mentions this concept.

secondary schools in minutes) is calculated and related to addresses: The colours of the address points show the minutes that a person living at this address needs for travelling to the next secondary school (represented by red pentagons with white letters). Based on the demographic information from the register, only addresses with residents in the relevant age group were considered.

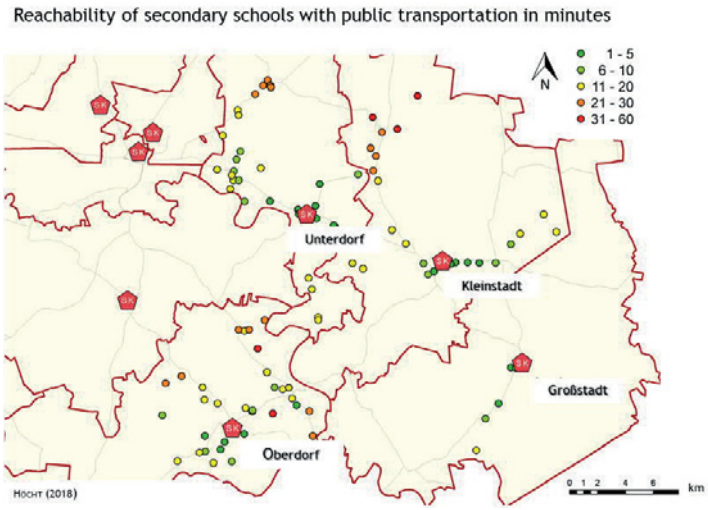

Figure 3: Reachability of schools using public transport.

5. Municipal population data for regional planning

The lack of small-scale population data is particularly challenging in federal states that carried out administration reforms leading to amalgamations of local public authorities. In Saxony-Anhalt for instance Gardelegen (ca. 23'000 inhabitants), Möckern (ca. 13'000) and Zerbst (ca. 22'000) form Germany's third, fourth and fifth largest cities in terms of area. These cities consist of several formerly independent boroughs and are partly located in sparsely-populated areas – leading to large city sizes contrasting with low population numbers.

As a result, cities of this kind inherited service and infrastructure facilities (e.g. football fields, playgrounds) from their formerly independent boroughs that today are sometimes redundant. At the same time, the population in many parts of Saxony-Anhalt is declining significantly, so that decisions on facilities' upkeep and transformation need to be taken. A gym from the 1970s might be renovated supporting a sports portfolio for all generations, especially seniors. Therefore, solid intra-urban information on demographic developments is of particular importance. Nevertheless, population data by Saxony-Anhalt's statistical office is available only for municipalities as a whole.

Against the backdrop of such challenges, the Ministry of Regional Development and Transport Saxony-Anhalt commissioned a study to test an automated provision of municipal population data via the federal state's spatial data infrastructure (SDI). A SDI is a set of geo-information resources consisting of technical, organizational and legal arrangements.

In a SDI, providers and customers of geo services cooperate with each other via the internet (GI-Service, 2017).

In this particular case, the geo service feeds population data from geocoded municipal registers into the statewide SDI. Firstly, a software has been developed and installed in the participating local public authorities. This software automatically geocodes register data, and process them in compliance with privacy regulations. One crucial prerequisite was to ensure privacy protection compliance already within the domain of the respective municipality. To achieve this, the data had to be aggregated spatially before transferring it. This time however, intra-urban units such as city boroughs but not the entire urban area served as spatial aggregation level. Additionally, the study design ensured that semantics[10] describing the spatial units did not allow for identifying individual persons (cf. Wegmann, 2017).

Secondly, both, the processed data as well as respective maps were provided via the internet. Geo web services in standardized exchange formats were applied. Standards as defined by OGC and INSPIRE are essential for the success of any SDI leading to technical interoperability.[11] As a result, "ready-to-use" intra-urban population data became available for both, the respective public authority as well as other authorized users. In addition, a web client was developed as a prototype to promote and further facilitate the data's usage (Kirschke, 2015). It combines the usability of established virtual globes with basic functionality supporting planner´s daily work. Implemented functions comprise buffer analyses and diagrams showing age groups for user-defined areas (Fig. 4).

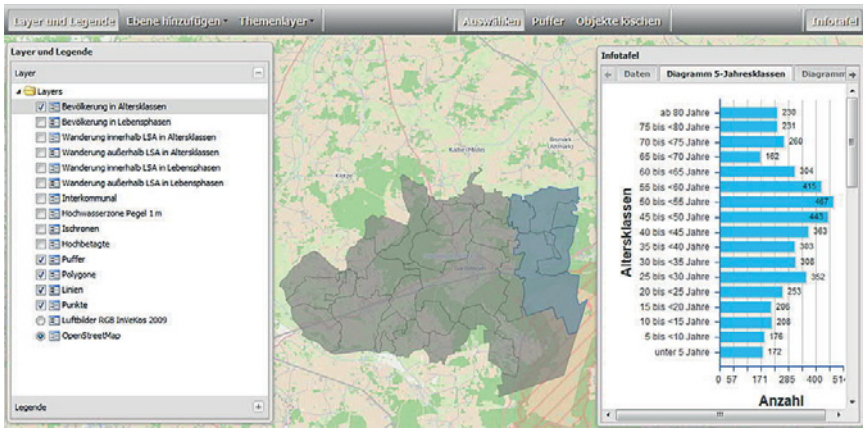

Figure 4: Web-GIS showing demographic information derived from a municipal register (Höcht, 2016).

10 This includes for example age categories or live stages by sex.

11 The Open Geospatial Consortium (OGC) is an international standards organization driven by commercial, governmental, nonprofit and research organizations on a voluntary basis. The Infrastructure for Spatial Information in the European Community (INSPIRE) is an EU-initiative to establish a SDI in Europe. Technical interoperability is characterized by software solutions that work together seamlessly due to standardized interfaces.

The study proved the technical feasibility of a SDI-approach based on municipal population data. However, a statewide rollout of the prototype is still pending because the discussion on privacy specifications is ongoing.

6. Discussion

Demographic products derived from population registers of many municipalities will find their way into the federal state´s SDI once the challenges mentioned above will be solved and a rollout in Saxony-Anhalt is realized. At that point, population data from all, municipalities as well as official statistical agencies will be available throughout the same geoportals – e.g. Geoportal.de, INSPIRE geoportal – ready for public use. For instance, official agency´s web services providing demographic information for municipalities, counties and federal states (as it is state-of-the-art) could be complemented by statistics on neighbourhoods, planning rasters or catchment areas derived from municipal registers. Are both data sources compatible with each other and can be used jointly, e.g. for comparative analyses?

It turns out that official demographic data products are generated differently from direct registration in municipalities (cf. Hausmann, 2012). This difference became prominent following Germany's most recent census in 2011, when the official population was adjusted downwards to 80.2 million (-1.5 million). It must be noted that a difference of 1.5 million is a higher number than the total population of EU member states such as Cyprus or Estonia. What is more, the difference between official population figures before and after the census 2011 can have a disproportionately high impact on the local level. Thus, the official population number of virtually every German municipality was corrected. While big cities like Bonn (-6.1%), Berlin (-5.2%) and Hamburg (-4.6%) "lost" a high number of inhabitants, the largest census winners or losers (pro-rata) are located in rural areas (Table 1):

Table 1: Zensus 2011: "Biggest losers" (cf. Elmer et al., 2017, based on official statistical agencies' numbers)

Municipality (federal state)	**Inhabitants** (census 2011)	**Loss**
Freistatt (Lower Saxony)	569	-42%
List (Schleswig-Holstein)	1549	-40%
Friedland (Lower Saxony)	7206	-35%
Ravengiersburg (Rhineland-Palatine)	311	-34%
Plön (Schleswig-Holstein)	8686	-32%

This deviation is a consequence of the methodology used for the official population estimation: Prior to 2011, the last census was conducted in 1987. Its results have been used as a base information for official demographic data sets and have been updated with change

information provided by each German municipality based on their registers.[12] However, despite the UN recommendation to conduct a census every 10 years, Germany took twice as long, which led to accumulated inaccuracies (Scholz and Kreyenfeld, 2017).

For the 2011 census, all municipalities transferred data derived from its registers to the statistical agency of the respective federal state. Earlier censuses in Germany were based on complete surveys. The step towards a register-based methodology as applied for the 2011 census reveals an interesting aspect: Obviously, official agencies trust the accuracy of municipal registers' quality as it was nominated as "ground truth" from where Germany's official population figures were calculated. Thus, apart from benefits regarding the registers' high resolution and actuality, its quality could serve as an additional advantage.

Yet, even municipal population registers have significant inaccuracies. These were tackled in the 2011 census by eliminating systematic errors, e.g. caused by foreigners that do not de-register when leaving Germany or students who do not register in their temporal home city for the limited period of their studies.[13] While such errors are more prominent in cities (Christensen et al., 2015), further inaccuracies with significant relevance for rural areas persist. For instance, we observed register errors in a rural municipality with a big nursing home. Like students mentioned above, seniors migrating to these facilities (or the persons in charge) obviously neglected to register in their new home town.

7. Conclusion

Local authorities in Germany store demographic attributes of residents together with their addresses in population registers. This makes them a data set suitable for describing the spatial dimension of demographic change even on the local level. Starting with addresses, demographic information can be aggregated in a flexible manner for higher planning units such as building sites, catchment areas or administrative boundaries by means of a GIS. Assessing this data set together with other geodata (e.g. street networks or locations of social facilities) additionally allows for intra-urban analyses (e.g. accessibility analyses) to support local service provision. Alternative demographic data sets provided by statistical offices of the federal states or the national level are frequently aggregated[14] and therefore cannot offer an equally good accuracy and flexibility as non-averaged data.

Due to its costly processing and legal restrictions, municipal population data is often neglected in Germany´s rural development and planning. Pioneering projects automatically process the register´s raw data into "ready-to-use" data sets. These initiatives should help to reduce processing costs significantly. Furthermore, the provision of municipal population

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12 For updating the population number information on influx and outmigration are taken from the *Melderegister*, while information on births and deaths are taken from the civil registry (*Personenstandsregister; destatis, 2014*).

13 For this reason, a complete survey of common housing ("Wohnheime und Gemeinschaftsunterkünfte") and additional interviews in cities with a minimum of 10'000 inhabitants were conducted (Christensen et al., 2015).

14 Spatially to entire municipalities or higher administrative units; semantically e.g. to predefined life stages.

data within a SDI has been tested in the federal state of Saxony-Anhalt. If privacy concerns are resolved, an information base suitable for inter-municipal planning could be established. For instance, by providing information for catchment areas beyond administrative boundaries, local population data no longer would be bound to administrative units or other spatial aggregation levels defined by third parties.

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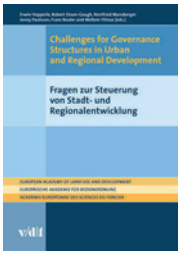

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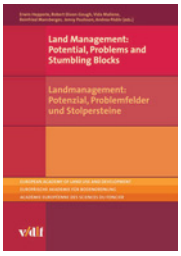

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Land Management is normally embedded in a complex legal context, which frequently consists of contradictory objectives, such as: strengthening of rural areas, satisfying the need for affordable living and commercial space, protecting environment and health, supporting transport infrastructure development, and preserving the landscape. Land management can be understood as a process that comprises coordination of such activities while managing the use and the development of land resources. It can be counstrained by the land use specifications resulting from spatial planning process. Along with this, the legal framework often contains generally formulated concepts and open standards, which provide a range of opportunities for realization while balancing the different interests. In this process it is important if and how both constraints and opportunities are recognised by the actors.

In this volume this topic is examined from various aspects: first the problems in promoting mutual understanding between researchers and the general public, but also among scientists of different disciplines; second the success requirements of land management instruments as well as unfortunate experience caused by land use changes; third covering land management costs by absorbing value increase and other trade off aspects; and fourth supporting land management by providing geodata with low-cost methods.

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