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CALCULATING THE DEPRECIATION OF STIGMATISED PROPERTIES

THESES

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BUDAPEST, 2020

"Values did man only assign to things in order to maintain himself—he created only the significance of things, a human significance! Therefore, calls he himself "man," that is, the valuator.

Valuing is creating: hear it, you creating ones! Valuation itself is the treasure and jewel of the valued things. Through valuation only is there value; and without valuation the nut of existence would be hollow.

Friedrich Nietzsche: THUS SPOKE ZARATHUSTRA

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1. Aim of the research project, topic specification

I first encountered the topic of my PhD dissertation as a young engineering student in the early 1980s. My father, who was a lawyer at a state investment corporation, UTIBER, asked me, the only family member who dealt with science at the time, for help in expropriation cases. Applying a comparative market approach to approximate the value of land was not a standard procedure at the time; the fact, however, that property has a value or price had already been accepted. In case of expropriations to build roads, legal disputes were always about whether a road construction increases or decreases the price of land. Some argued that the road had made the area in question more accessible, i.e. more valuable. Yet others argued that the construction entails dust, noise and inconvenience, and the traffic of the completed road would also be a nuisance. It was already clear at the time that the two parties with adverse interests looked at the same fact from two different viewpoints—what represented something positive for one was an unfavourable factor for the other. Later, as a practicing forensic property valuator, I faced damages caused (or believed to be caused) by environmental impacts and their extreme assessment in a market context.

As I was digging deeper into the topic, I realised that the professional property valuation standards applied in Hungary do not provide experts and courts with guidelines regarding the methodology of calculating the depreciation of stigmatised properties. Later, I also dealt with quite a few similar cases, such as depreciation due to airport noise, deprivation of view or the value implications of monument classification of an existing building. At first glance, these cases appear to be different, but they gradually revealed a pattern which international property literature refers to as stigmatisation — a real or perceived external effect reduces the market value without changing the physical condition of the property. What characterises these cases is that the extent of depreciation is heavily disputed, because no clear measurement or expert method exists to determine it. I compiled such cases with the purpose and hope that the processing of several cases would clarify the bigger picture. I feel I managed to synthesize the different sources and practical experience; this doctoral dissertation does, therefore, provide the opportunity to give shape to and disclose this synthesizing research project, after publishing the different partial results.

Let us return to the motivation behind my choice of topic. Since the late 1980s, I was among the first to study the theory of property valuation, and the title of my *doctor universitatis* dissertation submitted in 1994 was "Property valuation with modern methods". The doctoral dissertation in question served as the basis for the university textbook "Property valuation in Hungary", which has been revised several times and sold in about six thousand copies to date and remains a fundamental coursebook of property valuation courses in Hungary. In the twenty-six years that have passed since its first publication, the public perception of property and the property market has undergone considerable change and transformation. People understand the market, the time value of money, the laws of demand and supply much better than they did at the start of the transition to a market economy. The world has also changed: the great property market crisis disproved fundamental assumptions of the property business, which means that the international standards of property valuation are also constantly changing. New needs have emerged, new methodologies have been developed and financiers' expectations are becoming increasingly stricter. Therefore, the decades-old "modern methods" of evaluation are not so modern anymore, and it became advantageous to refresh and update thee old knowledge.

My doctoral dissertation discusses an exciting field of property valuation, the deterioration of stigmatised property. A paper on this topic must touch upon property valuation as a whole and its fundamental principles, methods and regulation as the chosen field cannot be interpretable without them. Therefore, this topic allows me to summarise and review the research project I started twenty-five years ago as well as revise previous findings, when necessary.

I would like to take this chance to thank my professors who directed my attention to this field — unknown at the time — and supported my work. First, I must say thank you to Mr. Miklós Sarlós, the instructor at the Department of Construction Technology and Management, who directed my attention to property valuation and encouraged me to obtain the *doctor universitatis* degree in the late 1980s. My property valuation research project was supported by the late Professor Ákos Detrekői, the later rector of the Budapest University of Technology, and the late Professor Jenő Klafszky, who went against the general view at the time that this topic has no academic merits. At the time I could already rely on the support of Professor Kálmán Horváth, who continued to give me professional support in the later stages of my career, for which I am particularly grateful. I am much obliged to the late Dr. Jenő Lévai or "Uncle Jenő" of the property profession, who encouraged my teaching career from the very beginning, and the devastating news of his death reached me while I was writing this paper. I must also offer my thanks to my colleagues at the Department, Levente Mályusz, Department Head, as well as Miklós Hajdu and Zoltán Rostás for their cooperation, ideas and support.

I have chosen a quote from Nietzsche as the motto of this paper. I quoted a part of Thus spoke Zarathustra in which the narrator explains how man has become a man through valuating things. A thing becomes what it is by being assigned a value judgment. Man valuates, evaluates, analyses and judges — any of these verbs could fit into the motto. Property valuation, a special profession, also covers the above activities: the expert expresses his/her opinion on the inspected property. Naturally, however, this review is subject to strict rules — one of which is that the expert should not express his/her personal judgment but model that of the community and the market. This expression of opinion has a simple scale: the property valuator applies only the dimension of "money". Although Nietzsche does not restrict the valuation of things to one dimension or another, a property valuator does not directly deal with concepts such as "beauty", "utility" or "goodness". For the property valuator, it is enough that money is used as the common measure for these and other value indicator concepts. This will be a nuisance for our topic, as the valuation of stigmatised properties focuses on this general agreement, i.e. measurability in terms of money.

Property valuation is a well-regulated and well-defined profession. It aims at modelling and estimating the price at which a property or a property portfolio might be exchanged — under particular circumstances. This modelling applies diverse methods which focus on simulating how the parties will or could come to an agreement. These methods are constantly developing, following the changes in technology, client needs and market changes. The new methods allow for more precise and accurate models, i.e. better and better valuations.

The problem of valuating and selling stigmatised properties is, however, not a simple issue of methodology but a problem of sustainability and the national economy. Environmental consciousness is a part of our everyday life: society as a whole and the academic community are more sensitive to environmental pollution. The relevant disciplines study the effects of individual pollution sources and various impairments to mankind, the environment and the economy in detail. The academic disciplines of sustainability have, however, so far failed to pay any attention to the property sector, i.e. the impact a pollutant source has on the market

values of the surrounding properties has not yet been thoroughly explored. Increasing environmental awareness has made it a current topic, partly because property owners have recognised the negative impact of various pollution sources on the market value, and an increasing number of them file claims for damages or compensation. Unfortunately, the impact assessments of establishing environmentally pollutant sources do not include the depreciation of neighbouring properties, and the legal disputes following the establishment have controversial and often exaggerated value judgments. These disputes are no-win situations for all parties. The investor regards any amount as extraordinary expenditure, while owners of neighbouring properties find any compensation insufficient. These, often decades-long, endless disputes are a burden to society and the courts. Preliminary quantification of property depreciation would be an important factor on both the project and national economy levels, and no responsible decision should be made without considering them.

This paper aims at systematising and standardising the methods of calculating the depreciation of stigmatised properties and providing solutions for determining the depreciation of stigmatised property.

The topic of the depreciation of stigmatised property has not yet been studied in Hungary. No professional consensus has been reached on the issue itself or the potential expert approach to the issue. This results in uncertainty in decision-making and for market players, leads to poor decisions, the unnecessary use of resources (litigation, settlement) and causes substantive project delays.

The significance of this paper lies in the way it seeks to summarise, analyse and synthesize such matters. I will point out that quite a few methodological tools exist for valuating such cases — for example, decades-long international experience exists for interpreting the stigmatising effect of airport noise. This paper will also show how this experience could be used in Hungary and assists valuators in choosing the right methodology.

The paper will also review the stigmatising effects experienced in practice and will rely on the results of previous research projects to characterise the mechanisms and scale of their depreciation. Secondly, this paper is also significant because it shows, as a result of the intense review of the professional literature, the expected range and fluctuation of depreciation in the different cases. Based on this detailed analysis, I have developed a theory that summarises all other concepts: a filter theory that systematically handles and explains the depreciating mechanism.

The circumstances in Hungary, primarily the lack of property market databases, create a special valuation environment which does not allow fully adopting international models. Relying on my analyses based on a wide range of stigmatised properties, I have developed a new and easy-to-use comparison method, the stigma–seal method, for market players and professionals alike. Another important result of my paper is the elaboration and disclosure of this method to determine and scale the relative extent of depreciation. This is not only a professional guide but also an awareness-raising tool for the market and its implementation could reduce the above-mentioned uncertainties. It becomes possible to estimate and plan the effects of the stigmatising investments in advance as well as to contain the social discourse on the potential depreciation caused by the investment; it becomes possible to reduce the above-mentioned wasting of resources which is caused by the disputes between experts and this tool, in my opinion, also provides property market players with the opportunity for a joint learning process

and eliminating the considerable differences that still appear in the calculation of the depreciation of stigmatised properties.

2. Structure of the dissertation

The first chapter of the dissertation describes the background, aim and significance of the research project as well as analyses and extends the concept of "stigmatised property". The second chapter (Chapter 2 "Methods for valuing stigmatised properties") describes the traditional and modern methodologies of this type of property valuation. The third chapter (Chapter 3 "Stigmatised property cases) reviews the potential cases mentioned in the literature and public discourse as well as their characteristics, similarities and differences. There are several cases in the practice of Hungary which I dealt with in detail in previous projects, which I will describe in more detail before reviewing other significant property market stigmas discussed in the international literature. The fourth chapter (Chapter 4 "Conclusions) organises these cases of the professional literature systematically and according to their potential aspects. I will rely on this system to review and summarise the definitions provided in the literature on valuation to offer a new, comprehensive definition which generalises and clearly delimits the scope of stigmatised properties. This chapter will introduce the model that describes the depreciation mechanism of stigmatised property. The concept, which I refer to as the "filter model", explains the process and extent of market depreciation. Finally, I will present a method of comparison which I have developed that is easy to comprehend and apply and I will present its application to calculate a few cases.

3. Research methodology

I basically used three types of sources in my research project. These include the following:

- International literature on valuation methodology,
- International literature on the different cases,
- Hungarian practical experience.

The first group of sources consists of property-related specialised journals, publications and materials of professional organisations. These provide professional guidance on property market stigmas. The presentation and analysis of non-traditional valuation methods are major topics of the international literature. The second group of sources includes materials from an extraordinarily high number of related areas. These materials are specific case or application-based analyses of researchers of architecture, urbanism, transport science, environmental protection, applied mathematics, IT and other fields. This body of sources is expanding practically day by day with new analyses as applicable models and increasingly accessible databases (Big Data) provide researchers with a broad range of increasingly new publications. I had a chance to familiarise myself with the practice in Hungary, partly during my professional activities and partly during the exchange of ideas at various property-related forums, especially since other experts who have similar methodological issues have been regularly requesting my advice since I started publishing in 2012.

Based on these sources, I reviewed various cases, prioritising the ones that are particularly problematic for Hungarian practitioners. The cases and stigmatising depreciating effects I discuss in the paper based on experience gained in Hungary include:

- Mobile towers,

- Airports,
- View restriction,
- Urban environment,
- Property under construction,
- Habited property,
- Community property.

The paper also reviews other cases mentioned in the literature, such as

- High-voltage lines,
- Noise,
- Foul odour, air pollution,
- Point chemical pollution,
- Landfill proximity,
- Regional building authority restrictions,
- Existence of easements,
- Haunted properties,
- Proximity to a sexual harasser or criminal.

I will also deal with a host of topics from related areas to better understand the mechanism of stigmas.

I have analysed the sources concerning each case type in the broadest possible scope and I did my best to synthesize them. The result of this synthesis is a unified system for various stigma cases.

I used the methodological toolset and the published results of individual cases to carry out several partial research projects to test each method. In the course of my examinations, I applied the following methods:

- sample space comparison (Hajnal 2017b),
- hedonic method (Hajnal 2012a), (Hajnal 2018),
- fuzzy logic method (Hajnal 2014),
- probability graph (Hajnal 2015b),
- yield calculation (Hajnal 2015c) and
- expert comment request (contingent) method (Hajnal, 2019a), as well as
- valuation method with function analysis (Hajnal 2019b).

My research project and doctoral dissertation was greatly supported by Grant Thornton Valuation Kft. This company and the Department of Construction Technology and Management of the Budapest University of Technology and Economics launched the Property Valuation Master Course in 2017, and they invited me to be its professional leader. The mission of the Property Valuation Master Course is to summarise existing Hungarian and international valuation knowledge, practice and information and convey this knowledge to the students of the master course; to ensure the accessibility of this knowledge to a wide range of professionals and ultimately, to increase the reputation of valuators. We have had 10 successful events so far, each of them focusing on a particular subfield of valuation. The instructors and participants of the Master Course have extensive professional experience. Several courses focused on my research field and the topic analysed in detail in the paper as well as several of its related issues.

I have integrated the feedback of the expert forum into the ongoing research project and I will provide appropriately references to the findings of the Master Course.

I have described the results of my research project based on the results of the preparatory work described in detail in the paper.

4. New scientific results of the dissertation

4.1.1. Definition of stigmatised property

Many different definitions exist for stigmatised properties (e.g. Patchin, 1988, Mundy, 1992, Morgan, 1994, Roddewig, 1996 or Slovic, 2009). Their definitions are controversial and are related to specific types of cases and geographical areas. There is no Hungarian definition for stigmatised properties. Therefore, property developers and valuators require a uniform nomenclature, and its most important element is the following definition, which applies to practice in Hungary.

> Definition: *Stigmatised property is a property assigned with a real or perceived negative external effect on the users. Said external effect modifies, reduces property market value through a specific, multilayered filter.*

International literature does not treat stigmatised properties in a uniform manner, and no such definition has been published in the Hungarian professional literature to date. Formulating a definition is, therefore, an important step for further studies as well as delimiting the boundaries of the presents research project.

4.1.2. Recommendation for the procedure to calculate the market value of stigmatised property

The international literature presented in Chapter 2 of the paper offers several methods and solutions to determine the market value of stigmatised properties. The RICS and USPAP policies offer methodological guidelines (RICS, 1995 and IAOO, 2001), and Kinnard (1998) also provides a review of available methods. Dozens of methodological guidelines have been developed for certain case types and methodologies. My paper describes the methods and their applicability in detail and classifies them in a unified system. However, these approaches may not be directly applied in a Hungarian environment and the efforts of international workshops must be standardised and adapted to Hungary. This necessitates developing a recommendation applicable to Hungary, allowing property valuators to choose the right methodology.

1. Thesis: *I have developed a recommendation that can be used in Hungary to select the method for determining the market value of stigmatised property.* The recommendation is illustrated by the following summary figure featuring the six major methodological groups and the specificities of the valuation.
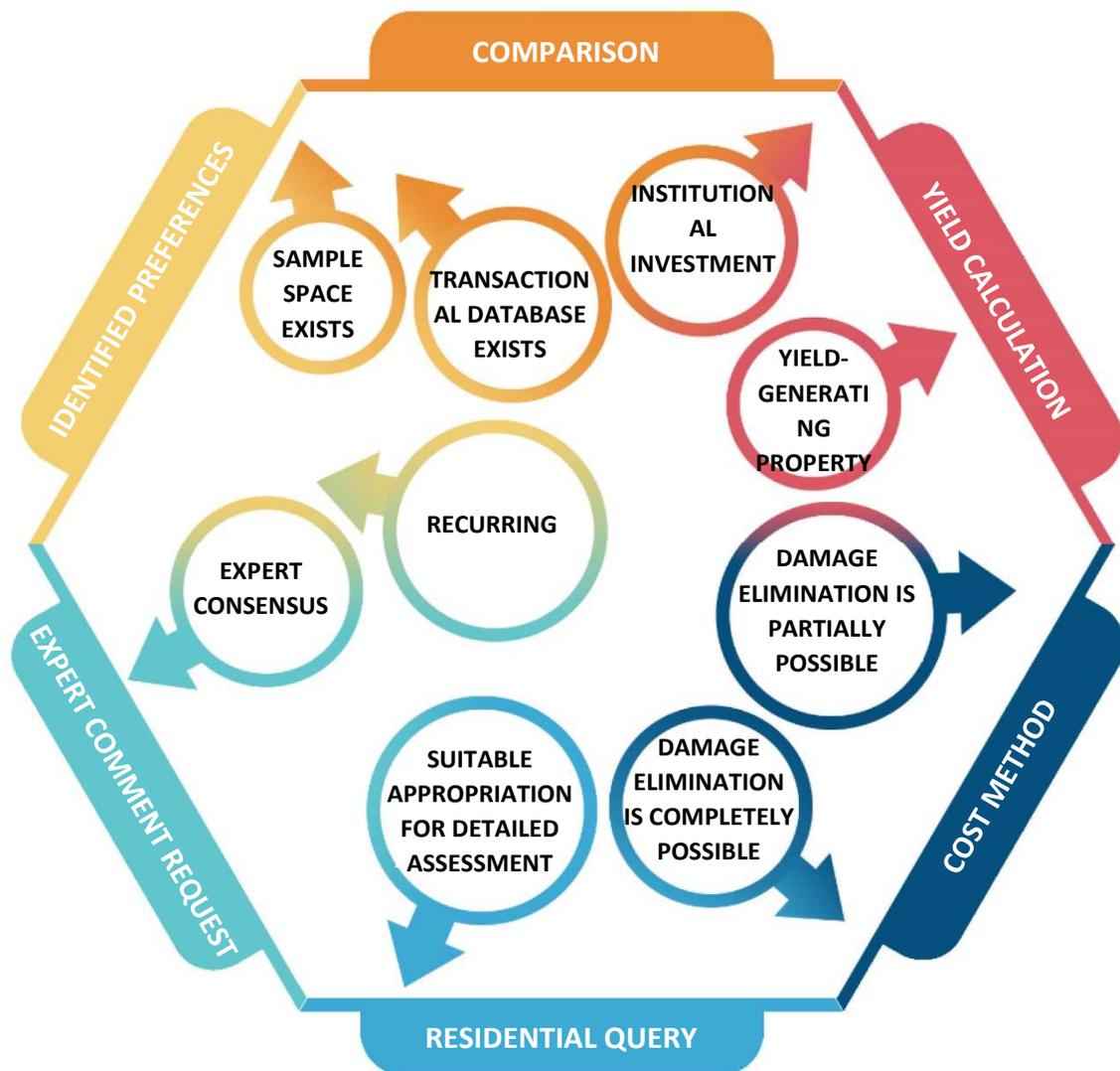
No such summarising methodological recommendation has hitherto been prepared in the Hungarian professional literature and practice.

Related publication: Horváth & Hajnal, 2014.

4.1.3. Method for comparing the depreciating effects of stigmas

Currently, there is no existing standardised international methodology, and therefore, no Hungarian practice to compare the depreciating effects of stigmas, which impedes the comparison of various depreciations calculated for stigmatised properties or even renders it impossible. Based on the literature and analyses of various case types, I have identified six typical dimensions that exist regardless of the stigmatising effect. These dimensions are the following.

- "space": The effect is either punctual or extensive in space, or occurs along a linear structure.
- "time": The effect occurs once, repeatedly or continually.
- "intensity": The disturbing effect can usually be classified as either weak or strong.
- "complexity": Is the case a result of a single effect or a combination of different effects?

- "remediability": Can the effect or case be eliminated with efforts, expenditure or other intervention? Can the intervention completely or partially eliminate the effect (effects)?
- "measurability": Can the case be described with scientific rigour? Is there a measurement method? How accurate is this method?

Representing the dimensions with a web diagram can characterise the cases, i.e. the larger the area, the more "serious" the case. This web diagram is the STIGMA SEAL, which can be used as a tool for comparison in practice. The stigma-seal can be used for multiple purposes; it is, therefore suitable for

- comparing different stigmas,
- comparing different locations,
- comparing the depreciation of different properties that are stigmatised in the same way.

2. Thesis: *I have developed a method for comparing the depreciating effects of various stigmas. This method is the identification of the stigma-seal. The stigma-seal can be used to compare different stigma cases, locations or different properties that are stigmatised in the same way.*

Currently, no standardised international methodology or Hungarian practice exists to compare stigmas. The stigma-seal is a comparison method that is well applicable in practice and provides the opportunity of estimating the scale of the depreciating effect of stigmas in settings where sufficient data is not available (e.g. Hungary).

Related publication: Hajnal, 2017a

4.1.4. Ranking the depreciating effects of stigmas

The stigma-seal methodology can be used, amongst other things, to compare the cases of various stigmatised properties. Based on the detailed analysis of the cast types, I used the STIGMA-SEAL methodology and relied on an expert panel to rank typical Hungarian cases. The following table shows the seal values.

Stigmatising effect	Seal value
airport	43
building restriction	39
high voltage	39
easement	39
radio tower	36
landfill	36
habitation	35
chemical pollution	34
view restriction	33
noise	30
air pollution	29
haunting	28
biological	27
bad neighbours	27
under construction	26

3. Thesis: *Assuming general Hungarian cases, I have applied the stigma-seal to rank cases of depreciating stigmas occurring in the literature and practice in Hungary.*

Current disputes among professionals in Hungary show an extraordinarily high deviation among opinions. My ranking delimits and narrows these differences in opinion.

Related publication: Hajnal, 2017a

4.1.5. Filter theory

Stigmas emerge and disappear. Something that was not a stigma 20 years ago might be one today and might not be one in 15 years' time. The various stigmas as well as identical stigmas on different properties have been assessed individually so far. Knowing the depreciating mechanism of a stigma allows for the uniform handling of stigmas on different buildings as well as understanding the depreciating mechanisms of new stigmas.

The change in value caused by the stigma takes place through a filter that combines the distance between the stigmatising factor and the stigmatised property, the environmental conditions and the community perception and interprets them differently over time. The essence of the filter theory is best illustrated through the following summary figure.

The stigma's depreciating effect: Filter theory
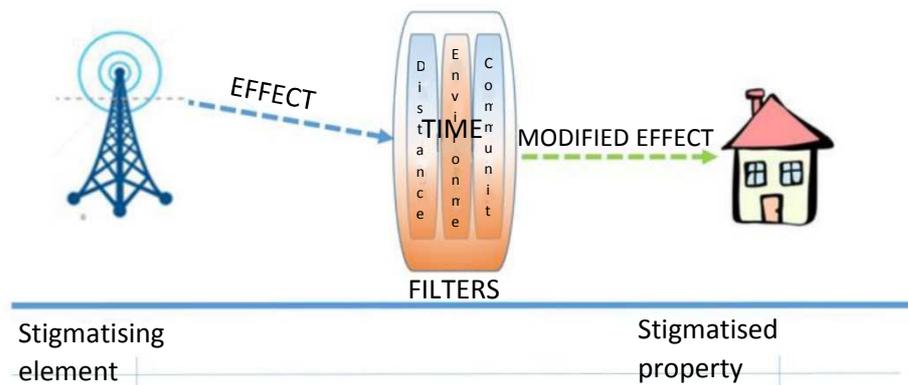
4. Thesis: *I have elaborated the filter theory to explain the stigma's depreciating mechanism.*

The depreciating mechanisms of stigmatising properties have not been previously managed with a unified approach of this nature.

Related publication: Hajnal, 2012b, Hajnal, 2017a

4.1.6. Findings concerning individual cases

My general thesis stated above can be used to quantify individual stigma cases. More similar partial research projects are required in Hungary to make this related area comprehensible and transparent to property developers, property valuators and the broader professional community.

5. Thesis: *I have made findings regarding the scale of the depreciating effect individual stigma cases.*

In the analysis of the stigmatising effect of mobile radio towers in the village of Kocsér, I established with hedonic analysis, that a mobile relay station depreciated the property portfolio by 3%.

Related publication: Hajnal, 2012a, Hajnal, 2012b

The analysis of Budapest properties subject to view restriction, carried out with the Delphi method, showed that the highest depreciation for view restriction in Budapest is 24%, which involves the obstruction of full-city views deemed to be the most beautiful, while partial view restrictions entail a depreciation between 11% and 13%.

Related publication: Hajnal, 2019a

In the case of the Budapest Liszt Ferenc International Airport, my analysis of the hedonic model generated from the sample taken from a database of advertisements found that the generally perceived extraordinary depreciating effect of 25% is not justifiable. If such an effect exists at all in this environment, it must be much lower. In the review of this analysis, I formulated the conjecture that local noise causes higher depreciation in case of properties of higher quality than in case of those of lower quality.

Related publication: Hajnal, 2017b

Studying the environmental impacts of the so-called ruin-pubs, I demonstrated (also with a sample-space hedonic model based on a supply database) that the generally perceived market value increase does not apply to the ruin-pub quarter. Supply price decomposition showed that location values are higher in Inner Terézváros than in Inner Erzsébetváros. Instead of the appreciation of the ruin-pub quarter, the market value remained under the values of the sample space with similar features due to the general market perception of noise, dirt and crowds.

Related publication: Hajnal, 2018

In the case of habited properties, I used the yield-calculation toolset to demonstrate that the value-modifying impact of habitants can range from 1% to 99% and, although this range is narrower than that in the overwhelming majority of the cases identified in practice, it may not be restricted to the 40% to 60% range specified in professional practice.

Related publication: Hajnal, 2015c

The results of the above-mentioned research projects show that the depreciation of stigmatised properties can be managed with the correct methodology, using a unified approach and the filter theory, even amongst the conditions in Hungary.

5. Further directions of research

Countless trajectories of research can be identified in the field of stigmatised property depreciation. The investigation of individual cases at different locations could also be the topic of countless studies and articles (we can also see that international literature is getting increasingly richer with new articles published practically every day). These research projects could be true gap-fillers amongst Hungarian conditions. The theoretical environment I have developed and presented offers an opportunity to prepare useful analyses for everyday practice and publish them for the professional community and the general public alike.

I feel that, beyond these basic research projects, three major theoretical issues will determine the further research of stigmatised properties.

In the present paper, I have treated stigmatised properties as individual units. As the smart city concept becomes prevalent, the future lies in the combined interpretation of the urban fabric (Z. Karvalics, 2017). Stigmas are threads and separate fabrics in the intertwined social, economic and urbanistic web of cities. The emergence and spread of stigmas can, in my opinion, be analysed in more detail with the modern tools of network research. As Barabási writes: The most important scientific discovery of the early 21st century is perhaps the realisation that every network and system emerges based on the same organising principle and operates with simple, yet efficient rules. (Barabási, 2003). In the modern city network, the context of stigmas could be interpreted in a future research project in this field.

Some of the methods presented in this paper could be used to develop self-learning methods. Artificial intelligence has already appeared in everyday property valuation and I believe that it will soon transform the entire property market, including the traditional market pricing model. It is perhaps not an exaggeration to say that AI will determine the property value, similarly toto the international stock exchanges. The next research project could aim at preparing as well as monitoring this process.

The third research direction I would identify is analysing the stigma affecting community values (e.g. the cited "experience value"). The market value investigated in the paper and its change caused by the stigma are the result of a relatively simple, purely economic value creation. Community value as a form of value is shaped in far more dimensions (Hajdu & Hajnal, 2018). A stigma can affect all dimensions (such as political, social, policy etc. dimensions); these effects are, however, not unequivocally the same or of the same trajectory. The mechanism through which a stigmatising effect influences (or can influence) the value of a community property as well as its income-generating ability is, therefore, is left to be analysed.

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