ENVIRONMENTAL AND ECONOMIC ASPECTS OF BROWNFIELD REVITALISATION[1]

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ABSTRACT

This study presents some general aspects of brownfields from definition to assessment methods. There are several approaches to define brownfield, but there is a common agreement among researchers on its typology. The economic and environmental aspects as evaluating methods depend on the varying revitalisation goals. But our goal is to analyse the different tools in order to find the best method for evaluation of environmental and sustainability state of the sub region and settlements in the North Hungary region. Among the available numerous tools SWOT analysis, Cost Benefit Analysis (CBA), utility based evaluation, indicator based sustainability assessment can be mentioned as most significant. In this paper we introduce the major evaluating processes and the risks of brownfield revitalisation, the rehabilitation possibilities and remediation.

INTRODUCTION

The problem solution of brownfield requires an interdisciplinary approach. It needs the harmonised approach of the natural science, social and economic aspects. The major related science fields are: geography (social and economic geography), space informatics, urbanism, regional development, environmental protection, regional science and statistics.[2]

The revitalisation of brownfield started in the European Union in the last decade. The sustainable urban development program (1998) focused to develop of brownfield area rather than greenfield development. The Urban II program has the target to regenerate cities and neighbourhoods, in which the brownfield have also priority. As mixed-purpose development, the restoration of buildings and public spaces, cleaning of derelict and contaminated natural environmental sites, conservation of historic and cultural heritage and sustainable job creation forms the field of the regeneration tools.

CLARINET[3] network has established a workgroup for brownfield revitalisation. The workgroup's most important goal is to make a contact between soil pollution and urban development (Barta, 2003). Recently in Hungary the issue of brownfield rehabilitation has become a key factor in designing urban territorial development in the practice and as research.

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[2] Czira, T. –Kukely, Gy.: Az átalakuló iparú térségek környezeti konfliktusainak fenntarthatósági értékelése Északkelet-Magyarországon Környezetállapot értékelés Program Pályázati tanulmányok 2003-2004 KÉP http://www.terport.hu/webfm_send/302

[3] „Contaminated Land Rehabilitation Network Technologies"

THE TERM OF BROWNFIED

There are a number of alternative definitions of "brownfield" land while the categorisation has a common feature. In general the term "brownfield site" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. It is a piece of industrial or commercial property that is abandoned or underused and often environmentally contaminated, especially one considered as a potential site for redevelopment (US EPA). Another definition: 'brownfield land is a land in a town or city where houses or factories have been built in the past, but which is not being used at the present time Barta (2003). Barta (2003) also states that the Hungarian situation differs from USA or Western European brownfield situations, although the categorisation of the brownfield is the same: industrial, mining site, railway field site, military or other. The reason of this differentiation is the characteristics of Hungarian industrial development, where the heavy industry and big manufacture was dominant. The revitalisation means reutilisation of mainly urban fields and differs from the term rehabilitation in the way that the later activity refers to the returning of the brownfield's original function. Both of the term involves remediation activities.

The Nicole project determines the different types of brownfield sites, that mainly use the risk based definitions of contaminated land. As it follows: previously developed land, historical urban green space, subject to legal sanction, land affected by contamination, derelict, under used and vacant. Similar to the above mentioned, COBRAMAN project categorised the following brownfield sites: industrial site; mining site; military site; railway land site; waterfront site; former city services site; other site.

But in all kinds of brownfield type the contamination of the environmental elements can play a significant role in its future utilisation: the pollution is blocking the economical development and reutilisation of the real estate. Soil contamination is especially pronounced negative considerations, also like unsettled ownership, the general speculation on the plots and buildings, low real estate prices due to the lack of reutilisation demand. As addition to the problems, the polluter is not responsible for the cause, but - after discovering the problem - the new owner is responsible for remediation. All these reasons are kept away potential investors from the brownfield areas, and they choose better, safer, green-field sites. (Czira, Kukely, 2004)

METHODS

As methodological tool we used meta-analysis. We reviewed scientific papers about brownfield, beside this the legislation background and revitalization projects were analyzed. We examined the methods used in economic and environmental evaluation of brownfields. This serves as starting point of our research in which our goal is to find the best adaptable methods for brownfield evaluation in the North Hungarian Region.

THE STATE OF THE BROWNFIELD

Problem solution of brownfield occurred firstly in developed countries like in the USA, England, France, and Germany, where the former heavy industrial area was left abandoned after the structural changes and demand came up for their rehabilitation (by the society). In USA the Brownfields Economic Development Initiative (BEDI) is a key competitive grant program that promote economic and community development. The main goal is the redevelopment of abandoned, idled and underused industrial and commercial facilities where expansion and redevelopment is burdened by real or potential environmental contamination.

BEDI funds are primarily targeted for use with a particular emphasis upon the redevelopment of brownfields' sites in economic development projects and the increase of economic opportunities for low-and moderate-income persons as part of the creation or retention of businesses, jobs and increases in the local tax base. The Brownfields Program creates many benefits for local communities in USA.[4]

Turning brownfield land into a successful green space is a central issue of European research program too. In Central Europe the COBRAMAN project is collecting and systemizing the knowledge of the revitalization projects[5]. This contains about 62 characteristic data of brownfield areas (localisation, area, present usage, owner, infrastructure, contamination etc.) connecting also to 42 Central European project in Czech Republic, Germany, Italy, Poland, Slovenia.

The brownfield project of the Centre for Environmental Studies was launched in 2004 in order to conduct a survey of Hungarian brownfield sites, collecting good and bad practices as well as foster exchange of experience related to their utilization. As the result of the survey in Hungary 183 brownfield site was located in 66 townships. In Hungary, approximately 12 thousand hectare brownfields are registered, what means 15.000 contaminated sites that are stored in a GIS information system called KÁRINFO. In North Hungarian Region the area of brownfield site is 1.414.761 m^2, and the economic value is at about 1561,2 million HUF.[6]. Another research has detected - in 2007 – 2.579 ha in the North Hungarian Region, which are divided to industrial area (46%), mining (5)%, military (8)%, and other (41%) types of brownfield site. From the 2.579 ha 13% related to former steel production. (Madarász, 2007)

REVITALISATION OF BROWNFIELD

Utilization of brownfields can play a key tool to prepare certain areas for new usage, to enable the growth of a region and to reduce regional differences. It serves as long-term development strategy. Taking out greenfield areas – from further industrial investments - contributes to the support of sustainable development. Many brownfield owners are unfortunately satisfied with leaving their properties in their current condition. In some cases the neighbourhood property owners may not support of the rehabilitation in brownfield sites, although the level of contamination is so slight that it seems unlikely to harm anyone – said the Brownfield Centre in USA.

When we want to evaluate the economic and environmental aspect of revitalisation firstly we need to review the *goals of redevelopment options.* Schädler et al. (2011) have collected these:

- alternative clean-up goals,
- alternative site use options,
- the social, economic, and ecological sustainability of land use alternatives,
- all of the economic implications, including clean-up costs, liability, and site use benefits,
- uncertainties,
- feasible and accessible to stakeholders, and,
- generate results that are understandable to stakeholders (not only to experts in the respective fields).

[4] http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/BEDI

[5] http://database.cobraman-ce.eu/

[6] Brownfield sites in the Northern Hungary The database was prepared by the Centre for Environmental Studies, 2004.

ASSESSMENT OF REVITALIZATION

There different kind of methods is for the evaluation of the brownfield revitalisation.

- SWOT (Data requirements)
- Conflict analysis
- Estimation of costs for site preparation
    - Groundwater remediation costs
    - Soil remediation costs,
    - Building deconstruction cost
- Market value estimation and mercantile value reduction (MVR)
- Sustainability assessment (Schädler et al. /2011)

Evaluating on base of SWOT

Schug and Ertel (2010) investigated different aspects, as well as micro and macro site, stakeholder interest, planning, key position within city department, situation of contamination, own identity of Feuerbach, good connection/accesability, station forecourt as space with potential, greenbelt, culture, politics, administration, investors and users, neighbours and inhabitants in the area, and they adapted these for pilot projects.

The conflict analysis

The conflict analysis is a procedure which identifies those regions on the site that will require remediation given the information on the distribution of contaminants, as well as on the map of compliance criteria attributed to each specific redevelopment option.

Estimating of cost clean up

- The type of cleanup required at a brownfield site depends on a number of factors. These factors include location, type and amount of contamination present, how widespread and deep the contamination is and the intended future use.
- The most common types of cleanups include removal or treatment of contaminated soil, capping and/or covering the contaminated area, and cleaning up ground water.[7]

Doick et al (2009) reviewed evaluations of brownfield greening projects. While definitions of a successful greening project vary, the focus tends to be economic, despite the difficulty in quantifying the financial benefits. The concept of 'success' tends depends on the funded or developer's needs, and under represents other stakeholders. For example, the social and economic wellbeing of the surrounding communities are often not considered. They suggested more focus on outcomes by the logic model, and a flexible monitoring process which involves a broad range of stakeholders.

Economic and environmental utility based evaluation

Madarász (2005) proposed an evaluating method on the basis of the risk and he developed a *qualitative evaluation matrix* of remediation actions and five criteria that the remediation goal value has to comply with:

- human health risk protection;
- environmental media status conservation;
- ecological risks aspect;
- financial feasibility;
- technical feasibility.

[7] http://www.epa.ohio.gov/portals/30/SABR/docs/Ohio%20Brownfield%20Toolbox.pdf, page 18

Estimated remediation costs contents:

- Groundwater remediation costs,
- Soil remediation costs,
- Building deconstruction costs,
- Market value estimation and mercantile value reduction (MVR),
- Sustainability assessment.

Evaluating based on indicators

Wedding and Crawford-Brown (2007) proposed 40 indicators in four categories to evaluate the sustainability and they applied weightings method too to determine the sustainable frame of redevelopment of brownfield.

CONCLUSION

The benefits of brownfield redevelopment are moving on a large scale. The benefits for community can be the eliminated health and safety hazards; eliminated eyesore sites. The revitalisation results in new investments with new job creation, increase in the productivity of land and property values and tax receipts for local and state governments.

During our research we found varying definitions of brownfield, a lot of evaluating and assessment methods and pilot projects serving as good starting point to find the best of evaluating methods for our region. Among these as best the 'estimated remediation costs content method' seems to be suitable for our region combining with the utility based practise.

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