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Brownfields do not “only live twice”: The possibilities for heritage preservation and the enlargement of leisure time activities in Brno, the Czech Republic

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Abstract

Central Europe is replete with legacy contaminated sites, commonly called “brownfields”. The question is what can be done to remediate them and make them again safe and useful to society. This question is addressed in post-socialistic city of Brno, the Czech Republic. Our

research assesses public perceptions of such sites that are currently utilized for the leisure time activities. Special attention is paid to public views of heritage preservation as an option for brownfield regeneration. The principal aim of the paper is to measure public support of heritage preservation through the conversion of brownfields to leisure activities and tourism. Data were gathered by means of the questionnaire survey with visitors of four brownfields currently being used for leisure time activities (n=130). It was revealed that the awareness of the visitors of the issue of brownfield regeneration is very low, and that importantly affects the perception of heritage preservation of individual sites. Further, the opinions of the respondents are significantly influenced by the local contexts of individual brownfields (predominantly by the situation and the technical state). However, it might be stated that in locations where the historical state of building has already been repaired, historical heritage is perceived more positively.

Keywords

Brownfields, Local Tourism, Urban regeneration, Brno, Czech Republic, Heritage

1. Introduction

Brownfields, either being narrowly defined as a contaminated area or more broadly as contemporary deserted areas with a potential for a further development, both belong to problematic places of the cities of the developed and the developing countries (Oliver et al., 2005). The issue of brownfields is broad and covers economic (van Duijn et al., 2016), social (Simis et al., 2016), environmental (Doick et al., 2009) and cultural dimension (Berg and Stenbro, 2015).

Brownfields regeneration is perceived as a significant element in the development of the contemporary cities (Alexandrescu et al., 2014). The regeneration is accompanied by the decontamination of sites, the increase in the economic activity, and it also enables us to preserve the cultural heritage for future generations. To spread the knowledge of these benefits among the population is possible mainly by continuous work with the local population, by information campaigns, or by temporary use – a kind of a trial basis – of brownfield sites. Brownfields with temporary uses are usually perceived by the public more positively than abandoned sites (Rall and Haase, 2011). Thus, the temporary use of brownfields creates great preconditions for accelerating long-term regeneration processes, or even the planning of such, and creates good conditions for public acceptance of new uses (Pizzol et al., 2016).

The opening of brownfields for tourists and visitors seems to be another important way how to attract public attention to brownfields issue. An increased interest in brownfields might increase a pressure on the decision-making sphere (Klusacek et al., 2011) and to push forward the regeneration processes (Alexandrescu et al., 2014).

An important issue in this connection is the protection of cultural heritage, and brownfields are such heritage. It is predominantly about using the spaces within cities related to some of their significant era (Xie, 2015), which provides the given environment of the city its unique and one-of-a-kind character.

Post-socialistic cities in Central Europe are the specific areas in which the issue of regeneration of brownfields is being solved within the transformation of their economies from the central planning model in the last quarter-century (Osman et al., 2015 or Maly and Mulicek, 2016). The problem of the frequent occurrence of brownfields in the 1990s as a

consequence of this overall transformation is combined with the economic weakness of cities, towns and communities that might be marked as one of the main barriers of brownfield regeneration (Krzysztofik et al., 2016). One of the model examples of such a city is Brno, the Czech Republic (Kunc et al., 2014) – a significant upper-regional centre with rich industrial history and huge efforts of the city administration to support the regeneration of local brownfields and to preserve historical heritage via various ways (Frantal et al., 2015).

Thus, the main aim of the paper is to measure public reactions to the idea of supporting heritage preservation through the conversion of brownfields to leisure activities and tourism. Brno was chosen as the case study.

2. Conceptual background

2.1 Urban brownfields, industrial heritage and public opinion

The ongoing discussions about the regeneration of abandoned sites resulted in several issues connected to urban brownfields: (i) the uncontrolled expansion of built-up areas on city margins, i.e. urban sprawl (Halleux et al., 2012; Vaclavik and Rogan, 2009) and on the contrary the re-urbanization concept (Ourednicek et al. 2015), (ii) the necessity of eliminating (or at least reducing) environmental burdens (Schoebaum, 2002), (iii) the reuse or demolition of brownfields as physical barriers to the urban development (Krzysztofik et al., 2016), and (iv) the emergence of socially excluded communities in the vicinity of brownfields (Greenberg et al., 2001; Kunc et al., 2014; Woo and Lee, 2016, Kabai, 2017).

But we can find many interlinks in relations between sustainable regeneration of brownfields and heritage preservation (Bliet and Gauthier, 2007; Duzi and Jakubinsky, 2013). An occurrence of “heritage“ is quite frequently perceived as a barrier to speed-up the brownfield redevelopment process (Berg and Stenbro, 2015). On the other hand, the preservation of heritage fulfils the characteristics of a public good, and increased costs for regeneration of such sites are justified (Sable and Kling, 2001).

The heritage preservation depends predominantly on recognizing its value by the developers (Rypkema, 2009). They are commodifying the heritage – in its new usage they keep the „old“, i.e. such thing that is unique to the place, making a profit, and the „old“ is protected from the demolition (Berg and Stenbro, 2015).

Public participation in the urban planning process is needed for the redevelopment of brownfields (Loures et al., 2016). The attitudes of residents, especially regarding the preferences for different types of regeneration, are of a great importance for this process (Glumac et al., 2015), and public support for the brownfield redevelopment project is seen as crucial (Kim and Miller, 2017). On the other hand, residents perceive favourably almost all the brownfield regenerations (Maliene et al., 2012). The attributes of a successful regeneration based on public opinion are generally: mobility and accessibility, use of renewable energies, environmental education, economic redevelopment, and safety/security (Loures et al., 2016). At the same time, the same types of regenerations may in different places cause a different level of satisfaction (Maliene et al., 2012; Franz et al., 2008).

We may thus conclude that the issue of preference of the relation of brownfields towards the historical heritage (here, most often industrial) is a significant topic when studying the broader relations of brownfield regeneration. The literature then reminds us of the existence of a general public opinion regarding the regeneration, yet the perception of the given regeneration differs from the other concrete regenerations. For this reason, we will focus our

research on three research questions: (i) are there any differences in preferences for brownfield regeneration among visitors of particular regenerated brownfields, (ii) how different are forms of regeneration for tourism perceived, and (iii) what role does the heritage play in influencing visitor's satisfaction when visiting a particular site?

2.2. Particularities of post-socialist space

The occurrence of brownfields in the post-socialist countries has been primarily caused by a set of social and economic factors appearing during the transition period from a centrally planned to a market economy since 1989 (summarized e.g. by Osman et al., 2015 or Berkes, 2016). These brownfields are often abandoned former military areas, sites left over from industrial or agricultural activities, abandoned buildings for housing, or disused transport infrastructure (Kunc et al., 2014). As the majority of brownfields that are located in cities usually are of the industrial origin, wider consensus exists that this type of brownfields is the most important for the development of cities (Filip and Cocean, 2012). Even though the majority of brownfields originated in the early stages of transformation together with the global changes of the economy of the last decade of the 20th century, a wider attention to brownfield-related issues was paid only after 2010 (Frantal et al., 2013). The reuse of brownfields is in the post-socialist countries a rather „new“ phenomenon (Frantal et al., 2015) and the private-public partnership, common in the western developed economies, is here only poor (Kunc et al., 2014). Some kind of selection or prioritisation of brownfields as tools for support regeneration has emerged only recently (Alexandrescu et al., 2017 or Bartke et al., 2016). Another problematic issue is sometimes the unclear ownership structure of brownfield sites resulting from the privatization process during the 1990s; due to a large number of unsuccessful privatisation projects, sites are sometimes still blocked by banks or the absence of unambiguous ownership (Frantal et al., 2015). A multiple ownership of sites, which complicates the consensus-building about the future use, is also quite common.

The areas occupied by brownfields usually form an important part of traditional industrial centres in Central Europe. These are an integral part of the identities of these cities (Suchacek et al., 2016). Brownfields in these locations create important spatial barriers limiting the suitable development of a compact urban organism (Kladivo and Halas, 2012). It is obvious that such a huge occurrence of brownfields and following efforts to make the regeneration of these sites easier frequently lead to underestimation of the importance of their heritage. Buildings are frequently remodelled or even demolished without any respect to their historical values (Gilbertova, 2017). Such a short-term profit strategy is fortunately regulated by efforts of the state; however, relatively low penalties for such behaviour in the post-communist countries sometimes favours the willingness to be penalised than to invest money for the preservation of the cultural heritage (Ashworth and Tunbridge, 1999).

Based on the above-mentioned information we can conclude that chances for heritage preservation in the environment of the post-socialist countries are different in comparison to the developed “western” part of the world.

2.3 Brownfields, tourism, and heritage

As stressed by De Sousa (2000) or Alker and Stone (2005), brownfields typically reduce the attractiveness and economic value of given neighbourhoods. This problem makes the utilization of such areas for both urban and rural tourism more challenging for a potential new development (Pavolova et al., 2012), especially if the sites are severely contaminated. On the other hand, many brownfields hold historic, architectural, or urbanistic values. If these sites

can be made more appealing to tourists, it would then help enhance their value for heritage preservation (Berg and Stenbro, 2015).

The regeneration of brownfields for tourism use has been studied, for example, by Edwards and Llorde-Si Coit (1996) or Levi and Kocher (2006). An attention has been also paid to the perceptions of already regenerated brownfields by tourists (Martinat et al., 2014). A lot of, even very big, brownfield regenerations in western Europe were aimed especially at tourists with leisure and conference facilities or hotels, as show the cases of Liverpool (UK) and Cologne (Germany) (Maliene et al., 2012) or Thessaloniki (Greece) (Skayannis and Kyratzakos, 2015). Similarly, it is the case of East Asia experience (Pan and Song, 2017). It occurs most frequently in cases of green spaces (e.g. De Sousa, 2003; Siikamaki and Wernstedt, 2008). Industrial forests in Germany are specific leisure spaces (Franz et al., 2008), which combine historical heritage preservation and the increase in the quality of the environment. Another possibility how to “solve” the dilemma of pulling down or keeping the historical values is their temporary use as we know it from Germany (Rall and Haase, 2011). The typical products of the travel industry are museums that provide the evidence of the original use of areas and buildings, most often these are former quarries as well as industrial factories (Table 1).

Table 1: Selected tourist destinations in Europe focused on former industrial activities

name of a brownfield site	focus	location	country
LWL Industrial Museum Zollern II/IV Colliery	mining and heavy industry	Dortmund	Germany
LVR Industrial Museum Mueller Cloth Mill	industry	Euskirchen	Germany
Netherlands Steam Machine Museum	industry	Medemblik	Netherlands
Ironbridge Gorge Museum	origins of industry	Telford	UK
National Coal Mining Museum for England	mining	Wakefield	UK
Royal Gunpowder Mills	industry	Waltham Abbey	UK
be Mine Mining Museum	mining	Beringen	Belgium
Eden Project	quarry	Bodelva	UK
Zollverein Coal Mines	mining	Ruhr Region	Germany
Cornwall and West Devon Mining Landscape	mining	Cornwall, West Devon	UK
Thessaloniki water supply museum	pump house	Thessaloniki	Greece
Big Pit National Coal Museum	mining	Blaenafon	UK
Vitkovice Lower Area	mining, iron industry	Ostrava	Czech Republic
Tarnowskie Góry coal mine	mining	Tarnowskie Góry	Poland
Guido Mining Museum	mining	Zabrze	Poland

Source: authors' own processing

The attraction of tourists to such destinations might also contribute to de-concentration of tourists from overloaded traditional urban destinations (Russo and Van der Borg, 2010). Gilg (2009), however, indicated that the perception of such sites by visitors is also very important and often opposed by locals.

The tourism potential of brownfields in the Central European context is still underestimated (Osman et al., 2015 or Stasakova and Kulla, 2016). Sometimes, the location of industrial brownfields within the city centres creates a great potential for the re-amalgamation of such sites into the living city organism attractive for visitors. Thus the use of such urban brownfields for tourism and leisure activities could definitely be an option for contributing to the sustainable urban development of cities (Steinfuhrer et al., 2010).

For these reasons, we consider travel industry a very specific and significant branch that is taking part in the development of revitalization of brownfields.

3. Brownfields in Brno

The city of Brno (population 377,973 in 2017) is the regional centre of the South Moravian region in the south-eastern part of the Czech Republic (see Figure 1 for the geographical location of Brno in Central Europe). Due to heavy industrialisation starting in the mid-19th century, Brno was until the 1990s a city with important textile, military, and engineering industries, once employing the majority of the population. Traditional branches of industry underwent a major restructuring after the fall of the Iron Curtain, while new light industries and tertiary and quaternary sectors were continuously developed. Traditional industrial areas in the proximity of the city centre were intensively abandoned after 1990, while new industrial zones appeared on the city margins. Nowadays, the majority of the Brno population is engaged in services industries, with the quaternary sector also showing dynamic growth. As a result of this transition, many brownfields now plague Brno. As a consequence, Brno pays a strong attention to the brownfield issue, systematically offering brownfields to the potential investors. The primary focus is devoted to the most spacious brownfields sites since they constitute an important part of the settled section of the city centre, the so-called „South Centre“. One result of this brownfield policy is a database of brownfields, developed in 2003, administered by the city and periodically updated.

The previous studies of brownfields in Brno found that the distribution of brownfields is spatially uneven (more brownfields are concentrated in some urban districts) and higher rates of regeneration have been detected in the densely built-up areas (inner city zones and housing estates), while lower rates are registered in the areas with a low population density and with a greater supply of green spaces (Frantal et al., 2015). Brownfields are not perceived by the inhabitants as an urgent problem to solve and the inhabitants are rather content with the city brownfield regeneration policy that already exists (Kunc et al., 2014). The potential development is associated especially with the South Centre (proposed future CDB of the city), where the most positively regarded brownfield regeneration by Brno citizens is situated - the Vankovka shopping mall, a contemporary art gallery and the adjacent Trinita office centre (Kunc et al, 2011) – and many other nowadays still not-regenerated brownfields (Kunc et al., 2014). Implications about the place-making of urban space of Brno by its re-use by urban farming has have been widely discussed by Koopmans et al. (2017). Coherences among brownfields regeneration in Brno, its use for the leisure time activities in the context of heritage preservation have not been previously studied.

Fig. 1: Location of Brno in the context of Central Europe



Source: authors' own processing based on data Eurostat GISCO; ArcČR 500 – Arcdata.

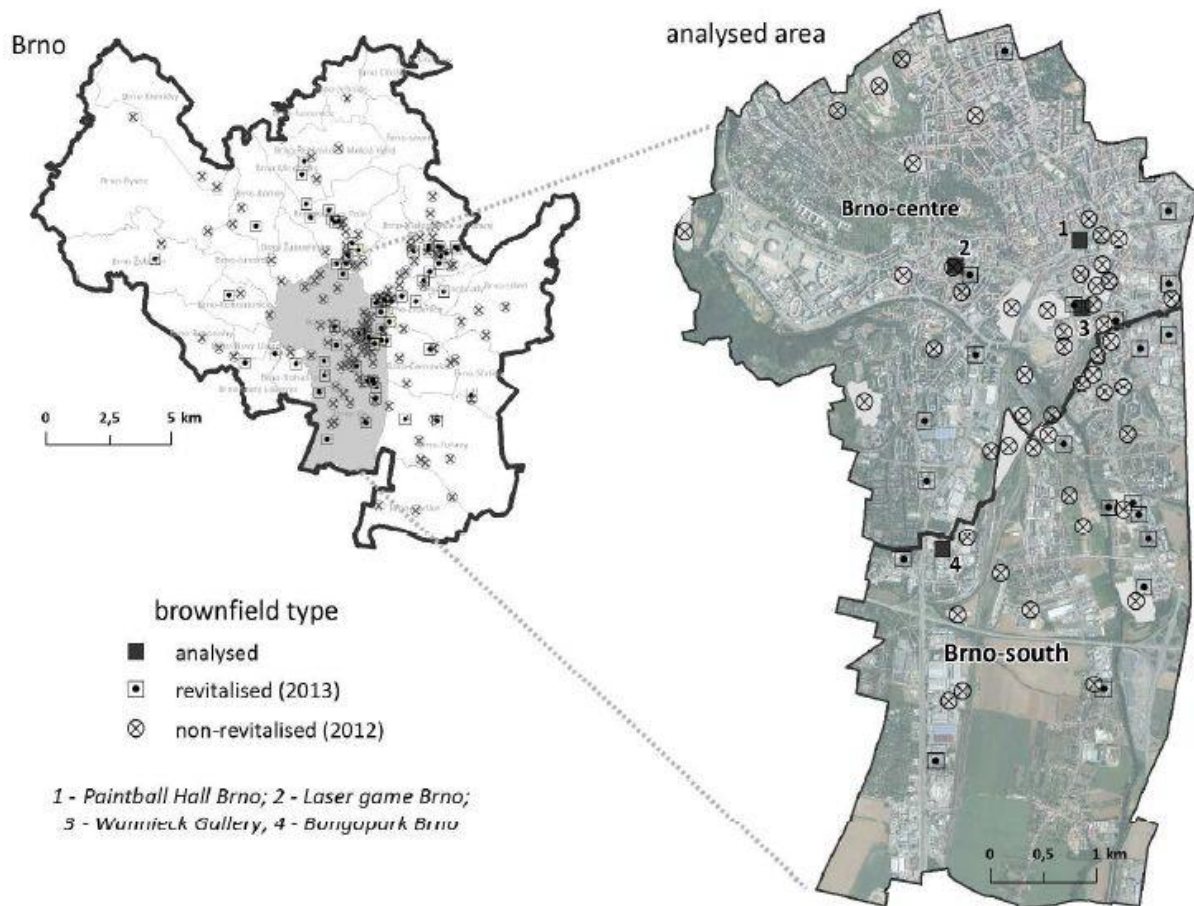
4. Methods

To fulfil the aim of our paper, the questionnaire survey was undertaken in four regenerated brownfields.

4.1. Study sites

To select the study sites, the Brno brownfields databases, both existing and already regenerated, 196 sites in total (Figure 2) were utilized. This database provided information about 25 brownfields already regenerated for leisure time activities with a straightforward touristic utilization. All sites were visited and four sites were selected – a shopping and an amusement centre, a family amusement park, a paintball zone, and a laser tag arena (see Table 2 for a description of individual sites). They included three sites originally hosting industrial use, and one that was used as a railway stock. In one case, architectural heritage was taken into account during the redevelopment (the Vankovka shopping mall).

Fig. 2: Location of surveyed study sites within Brno



Source: authors' own processing; data ArcCR 500 – Arcdata Praha; geoportal.gov.cz; www.brno.cz.

Table 2: Basic characteristics of surveyed brownfields

name of the brownfield site / location	original use	contemporary use	number of respondents	comment to the location	size of the site (m ²)	accessibility by public transport	status of the operator of the site
Vankovka (now RAG) (Dornych street, Brno-centre) Figure 3	foundry	shopping mall (+ gallery)	42	proximity to central railway station, wider city centre	3 700	very good	owner
Bongo Brno (Prazakova street, Brno-South) Figure 4	production area	family amusement park	19	outskirts of the city, proximity to highway	700	medium	in rent

Paintball Hall Brno (Benesova street, Brno-Centre) Figure 5	railway stock	paintball zone	37	immediate part of the central railway station, city centre	700	very good	in rent
Laser Game Brno (Hybesova street, Brno-Centre) Figure 6	production area	laser tag area	32	part of the wider city centre	400	Bad	in rent

Source: authors' own processing

Fig. 3: Vankovka shopping mall, originally hosting industrial use, architectural heritage was taken into account during redevelopment



Source: archive of authors

Fig. 4: Bongo Brno, originally hosting industrial use



Source: archive of authors

Fig. 5: Paintball Hall Brno, originally used as a railway stock



Source: archive of authors

Fig. 6: Laser Game Brno, originally hosting industrial use



Source: archive of authors

4.2 Questionnaire survey

The perception of the heritage preservation related to the brownfield regeneration for leisure time activities and tourism was studied via semi-structured interviews with visitors of the four above-identified brownfield sites, using a questionnaire form. The form was prepared on the basis of a thematic literature retrieval and was tested on 20 respondents during September 2013. The gathering of questionnaires was carried out in October and November 2013. The respondents were asked for cooperation in front of the individual buildings before or after their visit. Every tenth respondent was asked to cooperate to enable at least partial random character of the sample. In total, 150 questionnaires were collected, with 20 questionnaires being excluded from the sample due to unreliability. Thus, the following analyses are based on responses from 130 respondents (for the distribution among brownfield please see Table 2, fourth column).

The questionnaire consisted of 11 questions focusing on (i) the perception of former brownfield visited, (ii) general perceptions of brownfield regenerations, (iii) the importance of brownfield regeneration for current visitors, and (iv) the perceived heritage preservation by brownfield regeneration.

In its first part, we wanted to gather data regarding the awareness of the visitors. Thus, our first question was: “Are you aware that the site you are visiting was a regenerated brownfield?” with answers: ”yes“ or ”no“. The second question was “What was the purpose of your visit“ with a choice out of two stated responses: “to use the opportunity of the service offered“ and „,“a desire to see the regeneration of the former foundry“. The third question was: “Evaluate please which alternative reuse options would be most preferred for a given

visited site.“ The evaluation was done on a scale of 1 to 5 (with 5 being the most suitable alternative for reuse), a list of alternatives was: leisure time/travel industry (i.e. the current use), industry production, administration buildings, shopping centre, residential housing, car park, park, aquapark. The fourth question was prepared in connection with the third question: ”Evaluate please the functionality of the regeneration of the given visited site.“ The evaluation was done on a scale of 1 to 5 (1 = very bad, 5 = very good).

General perceptions of brownfield regenerations were studied within the second part of the questionnaire. The fifth question was aimed at the reputation of actual brownfields according to their origin, and respondents were asked: “How do you evaluate the possibility of the reuse of brownfield of different origin.“ A five-point scale was used (1 = very low possibility, 5 = very high possibility) and the list was: industrial brownfields, agricultural brownfields, post-mining brownfields, military brownfields, transport brownfields, residential housing brownfields. The sixth question was connected with the issue of the visitors’ awareness of the brownfields revitalization, asking: “Were you informed about the regeneration of brownfields from media?“ with possible answers “ yes“ or ”no“. If answering yes, the respondents were asked in the seventh question what kind of information they received from the media.

In the third part, the influence of travel industry on the regeneration of brownfields was tracked. The eighth question was: “Have you ever visited a regenerated brownfield within tourism activities?“ with possible answers “yes“ or “no“. If answering yes, the respondents were asked in the ninth question which brownfield they visited during their holiday.

The tenth question concerned the satisfaction of the visitors with the heritage preservation. We asked the respondents if they could evaluate the regeneration of the visited sites with respect to preserved heritage, evaluation was done on a scale of 1 to 5 (1 = very bad, 5 = very good).

As to the basic segmentation of the respondents, women slightly prevailed in the sample (53 %), while a two-fifths plurality of respondents belonged to the age category 18 to 24 years. University students represented more than a half of the sample, with the next 40 % made up from the economically active population (see Table 3 for basic segmentation of the sample). The average age of the respondents was low, reflecting the actual age structure of the visitors of the sites. More than 80 % of the respondents had a secondary education with a final exam or higher as their highest level of education. An important part of the segmentation characteristics of the respondents is related to their actual place of residence – 3 types are further mentioned as (i) Brno-inhabitants (= citizens of Brno); (ii) close-visitors (= inhabitants of South Moravian Region); and (iii) far-tourists (= visitors outside the South Moravian Region). Almost a half of the respondents lived in Brno and 90 % came from the South Moravian Region.

Table 3: Basic segmentation of the surveyed sample

Gender	female	53,8 %
	male	46,2 %
Age	< 18	13,1 %
	18-24	41,5 %
	25-34	25,4 %
	35-44	8,5 %
	45-54	8,5 %
	55-64	1,5 %
	65 <	1,5 %

Education	elementary	13,1 %
	secondary	38,5 %
	tertiary	48,4 %
Profession	Student	54,6 %
	employed	31,5 %
	self-employed	7,7 %
	retired	2,3 %
	parental leave	3,9 %
residence	Brno	48,5 %
	The South Moravian Region	40,0 %
	other regions	11,5 %

Source: authors' own processing

4.3 Data analysis

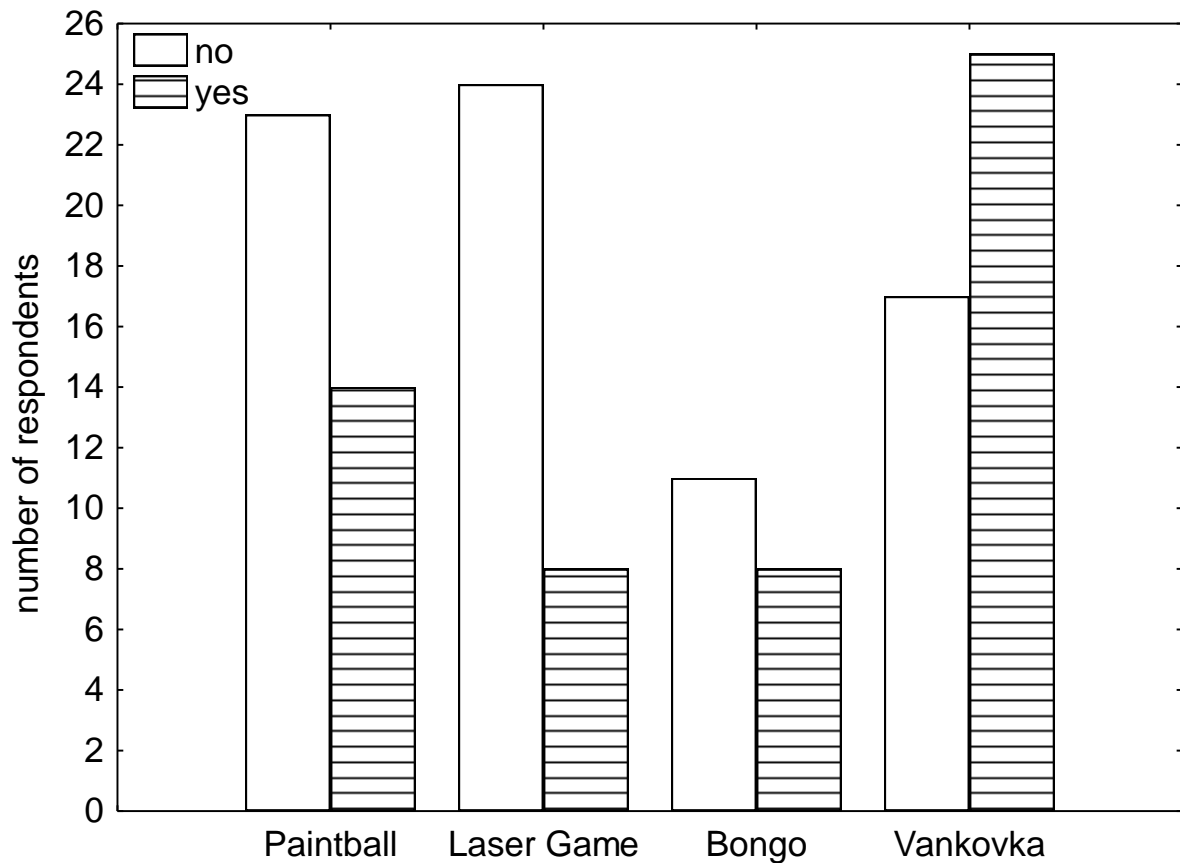
The fit of the collected categorical data was tested against theoretical distributions with the Pearson Chi-square test. Potential differences among the sites (four sites – Paintball Hall, Laser Game, Bongo Lark, Vankovka) and the types of visitors (three types – Brno-inhabitants, close-visitors, far-tourists) in ordinal scale were tested by means of the Kruskal-Wallis test. The Friedmann test was used to test the differences in the perception of the possibility of use for brownfields of different origin, as this evaluation is not possible to concern as independent one from the other. In two special cases, the redundancy analysis (RDA) was utilized. This multivariate technique was used when more than one dependent variable was measured – (i) the evaluation of alternative reuse options (8 options, each is dependent variable), and (ii) the evaluation of the possibility of the regeneration of a type of brownfield according to its origin (6 types, each is dependent variable). The statistical significance of the site and type of the visitor impact on the structure of responses was tested.

5. Results

5.1 The perception of the given regenerated brownfield

Nearly three-fifths (58 %) of the respondents were not aware that the site they were visiting was a regenerated brownfield (see Figure 7 for results of analyses). Statistical differences have been found in the awareness among the four study sites (Chi-square = 9.331; d.f. = 3; p = 0.025). A higher level of acquaintance with these background facts was ascertained in the cases of the Vankovka shopping mall (now the Richard Adam shopping mall – a former foundry). On the other hand, a lower level of an acquaintance than expected was found for the laser game. The awareness of the Paintball Hall (a former railway stock) and Bongo park visitors is as expected by null model. No statistical difference was found among the types of visitors (Chi-square = 2.106; d.f. = 2; p = 0.349).

Fig. 7: Knowledge of visitors that they visited regenerated brownfield



Source: own survey, $N = 130$

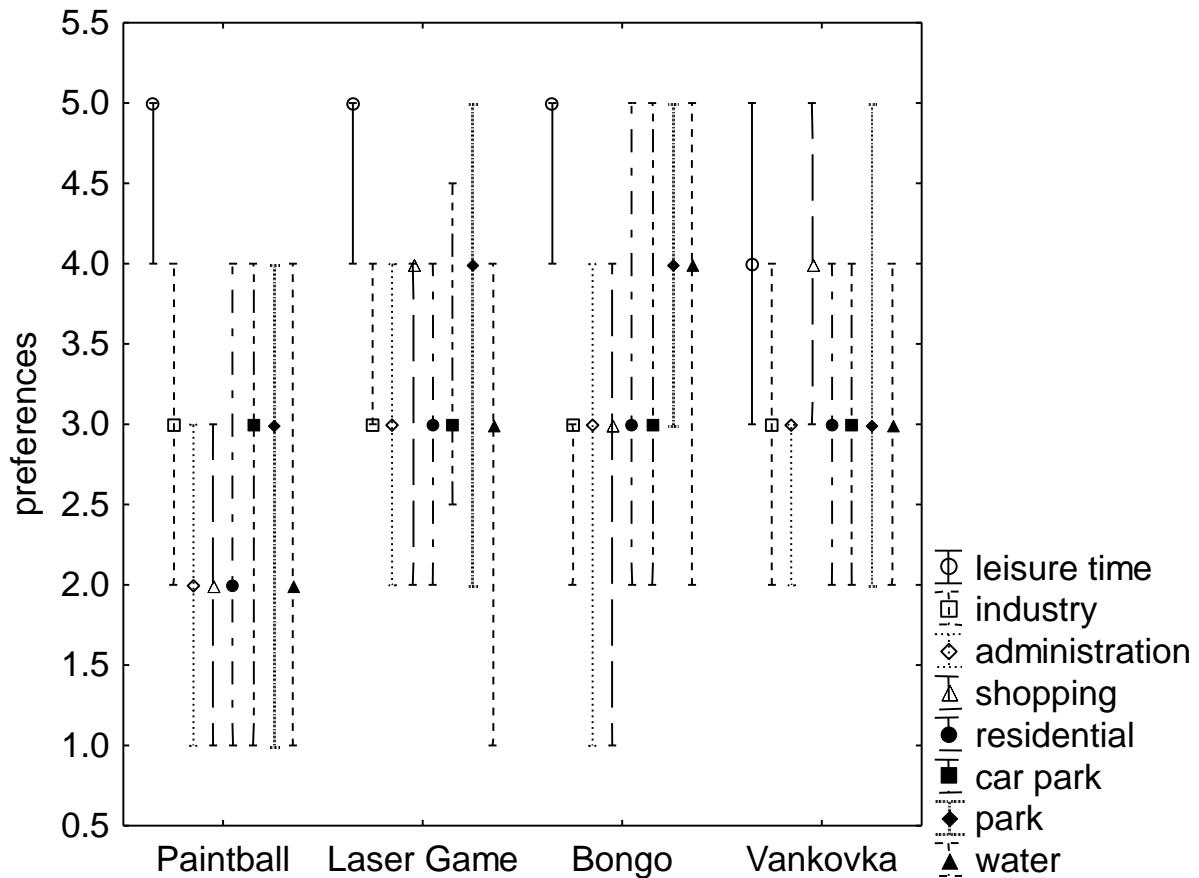
Only a marginal part (3 %) of the respondents stated that their visit was linked to a desire to see the regeneration of the former foundry – all are visitors of the Vankovka shopping mall and Brno-inhabitants.

The visitors are satisfied with the functionality of all four regenerated brownfields – medians for laser game, Paintball Hall, and Bongo park are „very good“, for the Vankovka shopping mall „good“ (Figure 8). The statistical test found a significant difference of ranks (the Kruskal-Wallis test: $H(3, N= 130) = 8.0756$ $p = 0.045$) indicating a slight difference among evaluating the functionality of the four sites, however, 2-tailed multiple comparison tests showed no statistical differences, the highest z-value 2.148 was found between the ranks of the laser game and the Vankovka shopping mall. The difference was also detected with the type of the visitor (the Kruskal-Wallis test: $H(2, N= 130) = 7.689$; $p = 0.0214$). For far-tourist and Brno-inhabitants, the median is “very good“, for close-visitors it is only “good“. The multiple comparison test revealed a greater difference between close-visitors and Brno-inhabitants (z-value = 2.354; $p = 0.056$, thus at the edge of the statistical significance).

An actual regeneration of former brownfields is only one of the vast list of the potential regenerations. The respondents were asked to evaluate the suitability of alternative reuses from their point of view. The most suitable for all four sites seems to be the current use for tourism and leisure time activities. Such result corresponds with the previous result, as – medians for laser game, Paintball Hall, and Bongo park are “most suitable“, for the Vankovka shopping mall “suitable“. As suitable were also found shopping mall for laser game, park for laser game and Bongo park. No other reuse was found suitable for Paintball Hall visitors.

Overall, these differences among visitors to four sites are statistically important (RDA; pseudo-F = 4.4; $p = 0.020$). No differences among far-tourists, close-visitors, and Brno-inhabitants were found (RDA; pseudo-F = 0.9; $p = 0.508$).

Fig. 8: Preference for re-reuse options of the visited sites, median and 2nd and 3rd quartiles are shown



Source: own survey, $N = 130$

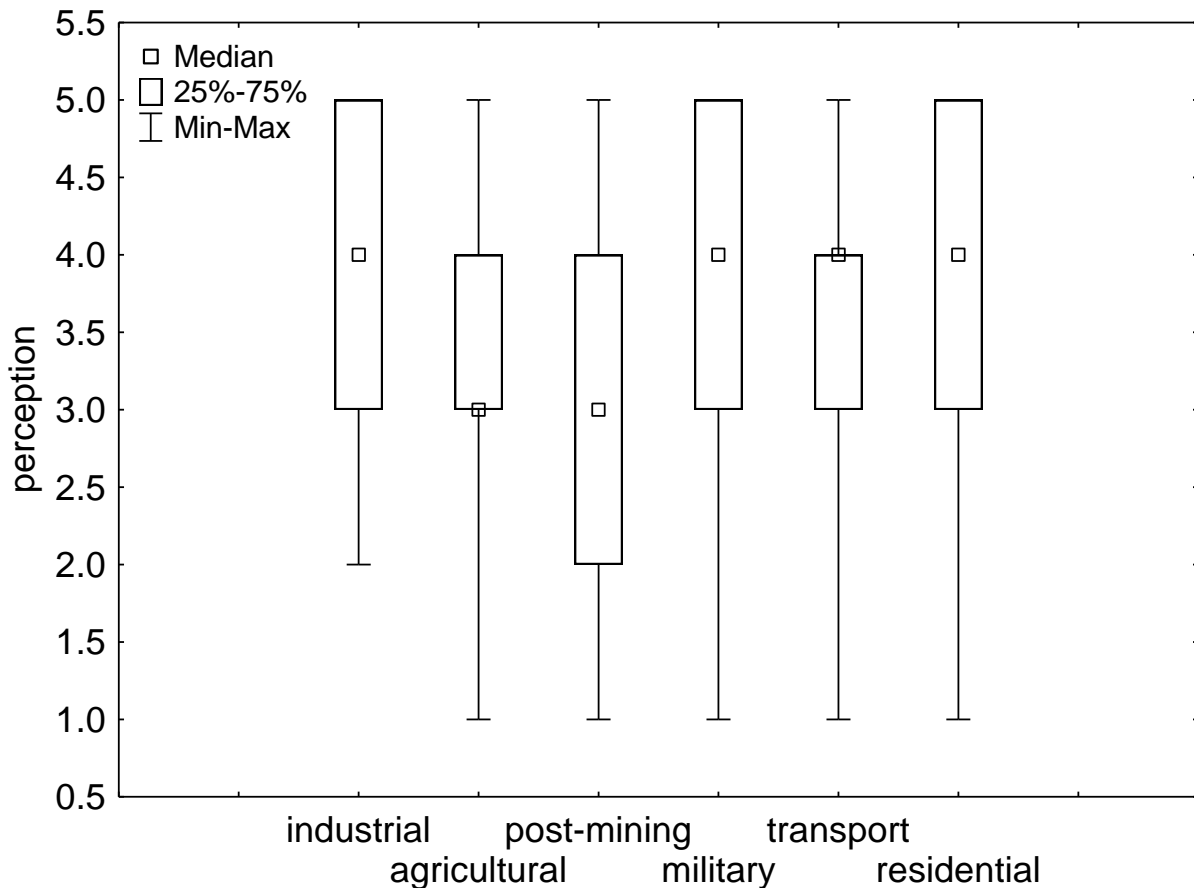
5.2 General perceptions of brownfield regenerations

The general perception of brownfields was assessed on the basis of the evaluation of the possibility of reuse of brownfields of a different origin for different purposes. No differences were found between the structure of answers and the site where the answers were collected (RDA; pseudo-F = 2.5; $p = 0.234$) as well as among the types of the respondents (RDA; pseudo-F = 0.8; $p = 0.629$). The possibility of use varies significantly according to the respondents (Friedman test; Chi Sqr. ($N = 130$; d.f. = 5) = 127.895; $p = 0.00000$). Post-residential brownfields (abandoned prefab houses, dormitories for workers, etc.), industrial brownfields, and military brownfields are perceived as being the most preferable (Figure 9).

On the other hand, agricultural and post-mining brownfields were ranked the lowest regarding the regeneration options. To deepen the knowledge of public awareness of brownfields regenerated for tourism, respondents were asked about sources of information on these sites and on other particular brownfield sites. Only one-tenth of respondents were informed, using various sources of information, about other successfully regenerated brownfield sites. No statistical differences among sites (Chi-square = 2.571; d.f. = 3; $p = 0.463$) were found. However, once again the statistical difference in brownfield awareness between Brno-

inhabitants and close-visitors was found (Chi-square = 6.369; d.f. = 2; p= 0.041). Brno-inhabitants are better informed about brownfield regeneration than close-visitors.

Fig. 9: The regeneration potential of individual types of brownfields (according to their original use)



Source: own survey, N = 130

5.3 Regenerated brownfields as tourism “destination“

Only one-fifth of the respondents stated that they have visited regenerated brownfields for leisure time activities before. Even if the respondents were aware of a visit to some other brownfield, it was usually another case study of this research (the Vankovka shopping mall, and the Bongo Park). Most usually mentioned examples of regenerated brownfields reused for tourism outside Brno were the Granary (Sypka), a leisure centre in Jevišovice (South Moravian Region), the Wellness Babylon Centre in Liberec (the Liberec Region), and the Permonium family amusement park (a former mine) in Oslavany (South Moravian Region). No differences among sites (Chi-square = 3.466; d.f. = 3; p = 0.325) as well as types of visitors (Chi-square = 2.183; d.f.= 2; p = 0.336) were found.

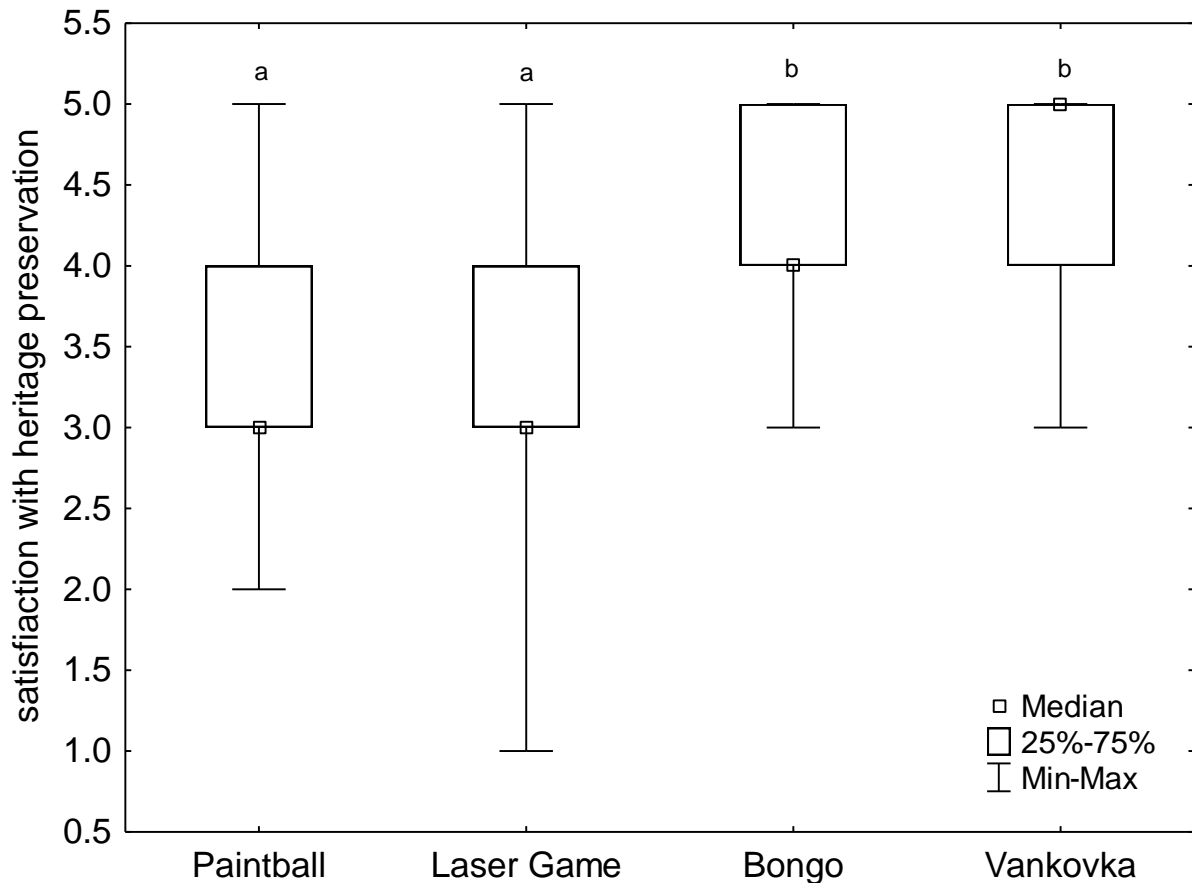
5.4 Satisfaction with heritage preservation

The final question in our questionnaire was aimed to identify how heritage is reflected in visitor’s satisfaction with visiting a particular site. The visitors are satisfied with the way of heritage preservation in case of Vankovka shopping mall – median is „very good“, and in case of the Bongo park - the median is „good“ (see Figure 10). Neither satisfied nor dissatisfied are the visitors to the Paintball Hall and laser game. The statistical test found a significant difference of ranks (the Kruskal-Wallis test: H (3, N= 130) = 50.359; p = 0.0000) indicating a

high difference among evaluating the heritage preservation of the four sites. The results of 2-tailed multiple comparison tests are highly significant as well (Figure 10) – the group Vankovka – the Bongo Park is highly different ($p < 0.01$) from the group Paintball Hall – laser game.

It is interesting that there is no correlation between the evaluation of the functionality and heritage preservation (the Spearman rank correlation coefficient = 0.09).

Fig. 10: The degree of satisfaction with the way of heritage preservation when reusing brownfield. Medians with the same letter do not differ significantly ($p > 0.01$)



Source: own survey, $N = 130$

A difference among the type of the visitor was also detected (the Kruskal-Wallis test: $H(2, N=130) = 6.015$; $p = 0.049$). Close-visitors and Brno-inhabitants are more critical with the median „good“, far-tourist reached the median „very good“. The multiple comparison test revealed a greater difference between far-tourists and Brno-inhabitants (z -value = 2.354; $p = 0.056$, thus at the edge of the statistical significance).

6. Discussion

The perception of heritage preservation related to the brownfield regeneration for leisure time activities and tourism by its visitors were studied within the city of Brno on four sites. The survey targeted the identification of the awareness of respondents regarding the brownfield regeneration and the impact of the site as well as the origin of the visitor on this awareness. The results show that there are diverse linkages among the variables under study. Out of a large amount of partial results, the three following findings are fundamental for the objective

of this paper: (i) the awareness of the visitors of the issue of regeneration is very low; (ii) interesting consequences of the perception of heritage preservation; and (iii) the impact of the site on responses.

6.1 Low awareness

Our results support the results of the previous studies. The response of the visitors to leisure time facilities is positive (Maliene et al., 2012). However, the knowledge regarding the heritage of the present site as well as the global brownfield issue is very low (Martinat et al., 2016).

Only every tenth visitor of the regenerated brownfield was able to recall that she or he gained some information on brownfield regeneration from the media or from the social group she or he is involved with. Based on this information, we can conclude that the public awareness is extremely low. The statistical treatment revealed that Brno-inhabitants are better informed about brownfield regeneration than close-visitors. Here, we may notice the effort of the city to publicise the idea of public support of the brownfield regeneration (Kunc et al., 2014).

On the other hand, twice as many of the respondents are aware of the fact that they visited the regenerated brownfield. Such difference cannot be coincidental. The difference may be caused by the information provided directly within the area of the regenerated brownfield (Harting et al., 2012). The visits of the regenerated areas and communication with the visitors thus may be the main key to the popularization of the issue of brownfields (McKean et al., 2017). This is also confirmed by the fact that twice the amount (i.e. two-fifths of the respondents) of those who have already visited the brownfield were aware of the fact that the place of their visit was a regenerated brownfield. Yet, we must understand that the site of Vankovka shopping mall is mainly the only reason for such amount. The Vankovka shopping mall is “a trademark“ generally assessed in the Czech Republic as an example of a successful brownfield regeneration of a former foundry into a shopping mall and gallery (Kunc et al., 2014) with not only preserved but repaired old buildings, as other western megaprojects (Doucet et al., 2011). The character of regeneration is thus influenced by creating the awareness of the brownfield regeneration (Loures et al., 2016).

The level of awareness and experience then influence the public opinion (Joerin et al., 2009). Such fact is being reflected in the perception of the possibility of brownfields regeneration – post-residential brownfields are perceived best (abandoned prefab houses, dormitories for workers, etc.), industrial brownfields, and military brownfields. Surprisingly, also industrial brownfields fall into the first group, generally perceived in the city as being highly problematic (Loures and Vaz, 2016). On the other hand, agricultural and post-mining brownfields were ranked in the lowest positions for regeneration options. Especially the latter are of a great development potential, even for leisure time activities and tourism (Sardinha et al., 2013 or Frantal, 2016).

In several areas, the influence of the type of the visitor on the awareness of confirmed. The most interesting ones are related to heritage – for more see further on.

6.2 Brownfields, tourism, and heritage issues

Heritage preservation is perceived very well only on site Vankovka. It has been already mentioned above that Vankovka is a specific example regarding the issues of brownfields regeneration, tourism and heritage. It is an example of commercialization of unused space, its successful branding and building of trademark. It is the only locality whose visitors arrived

merely from the interest to “take a look how this area was regenerated”. The heritage preservation and the reconstruction of the historical design may be involved in the highest level of awareness of its visitors. At the same time, their visitors are the most critical ones in regards to the functionality of the regeneration, yet when asked about a different utilization other than leisure time facilities and shopping mall, they did not suggest anything.

We must mention here that with the other three localities, the heritage was also preserved, but the buildings are the same as they used to be 30 years ago. In the locations that are not in the good technical state, the preservation of historical heritage is perceived not well. On the other hand, in locations where the historical state of the building has already been repaired, historical heritage is perceived more positively (Berg and Stenbro, 2015).

On the whole, the regenerations are assessed better by the tourists than by the population of Brno city or the South Moravian Region. The difference between the perception of the brownfield regeneration among tourists and inhabitants was identified even earlier (Kunc et al., 2014). We must be aware of the potential problems when making decisions about form, content and extent of the regeneration (Alexandrescu et al., 2014).

It is remarkable that there is no correlation between the evaluation of functionality and heritage preservation. The functionality and the appearance with historical tradition are two separately assessed entities.

6.3 The impact of the site on responses

From the methodological point of view of the research of brownfields, a remarkable result of this paper is the different impact of the site on responses. The impact of the site of interviewing was confirmed with all questions connected with the locality. The condition of the situation thus significantly influences the opinions of the respondents about the individual regeneration. The individual brownfields differ from each other and any generalization must be done with a high level of caution (Simis and Awang, 2015).

On the other hand, with any of the general questions on brownfield regeneration, the impact of the site on responses was not proved. The respondents are thus able to provide us with information about their preferences or perceptions without any significant impact of the place of interviewing, which is an important finding for further researches.

7. Summary and conclusion

We conclude that even greater numbers of unused sites can be developed for tourism and leisure time activities which – if accompanied by a suitably sensitive preservation of landscape, historical, architectural, or aesthetic values – can serve as a benefit and public interest of the whole society. It is apparent that forming and adapting urban structures under such influences is beneficial for further urban development. Nevertheless, the basic precondition for making such a policy of brownfields regeneration possible is accelerating the systematic and coordination position of the decision-makers, and to support efforts to increase the mutual communication between private owners, public bodies, and local citizen groups. Most important, we find that societal concern about cultural heritage, if supported by massive educational efforts, might become another accelerator for speeding up the regeneration process in the Central Europe.

Low public awareness of the issue of brownfield regeneration bears important consequences for heritage preservation. It was also ascertained that individual brownfields are of the site-

specific nature that complicates attempts for the generalisation of gathered knowledge. The response of the visitors to leisure time re-use of brownfields is positive, significantly contributing to the amalgamation of the formerly abandoned sites to the vital parts of the city. It also seems that inhabitants of Brno are much better informed about brownfield regeneration than visitors from the wider region. We can say that the visits to the regenerated areas and communication with the visitors thus may be the main key to the popularization of the issue of brownfields. As an exceptional case, the Vankovka shopping mall has to be emphasized. This site is generally perceived in the Czech Republic as the flagship of successful brownfield regeneration projects. From a variety of types of brownfields, the post-residential brownfields are perceived best.

Heritage preservation is particularly well regarded by the public in case of the Vankovka site. While admittedly, conditions and options at brownfield sites are highly site-specific, it was revealed that, on the other hand, in locations where the historical state of the buildings has already been repaired, historical heritage is perceived more positively. To sum up our results, the situation and technical state of individual brownfields significantly influence the opinions of the respondents about the individual regeneration options. Although individual brownfields differ from one another, this paper suggests that historical preservation can help speed the regeneration of contaminated sites and again make them useful and safe for public use in the Czech Republic and elsewhere.

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