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Location of Economic Activities in the Ostrava Metropolitan Area: Focused on Brownfield Redevelopment

Jana Nekolová, Jiří Novosák

Abstract

Differences between brownfields, stable sites, redeveloped sites, and newly developed greenfields sites in the Ostrava metropolitan area are subject of analysis in this paper. The analysis is embedded in the discussion on location of economic activities. Ownership structure, transport accessibility and the threat of environmental burden were identified as statistically significant location factors of such differences. In addition, the “if-then” decision rules are generated to identify what combinations of values of location factors classify sites as brownfields, redeveloped sites and newly developed greenfields sites. The brownfield issue is regarded as the most relevant theme politically. In this regard, two types of brownfields are recognized. First, there are large brownfields located in the compact inner city zone. The development potential of these sites tends to be further worsened by intricate ownership structure and extremely high threat of environmental burden. Second, there are small brownfields located in peripheral areas of the model territory. The development potential of these brownfields is affected by their complicated ownership structure.

Keywords: location of economic activities, brownfields, greenfields, redeveloped sites, Ostrava metropolitan area, Czech Republic

JEL codes: R32, R12, Q24, R58

1. Introduction

There is a long history of research on location of economic activities. In this regard, the classical von Thünen’s location theory (e.g. von Thünen, 1826) and Weber’s theory of industrial location (e.g. Weber, 1909) may be at least mentioned. However, despite its long history, location of economic activities remains an important research and political theme also nowadays. Regional and local development is influenced by the ability of territories to attract and retain economic activities. Not surprisingly, various characteristics of these territories – location factors in other words – play an important role.

The research on location of economic activities is related to different contexts. First, there is a rather extensive research on location behaviour of transnational corporations (TNCs) at the

macro and mezo-spatial levels (see e.g. Defever, 2006; Mayer, 2004; Nachum, 2000; Yavan, 2010; Disdier and Mayer, 2004 and others). Second, a number of studies deal with location behaviour of small firms and new firms – as a contrast to the large multi-plant TNCs (see e.g. Stearns et al., 1995; Renski, 2008; North and Smallbone, 1996), including the urban-rural relations (see e.g. Patterson and Anderson, 2003; Akgün et al., 2011). Third, the relationship between location on the one hand and innovative activities on the other is a frequent subject of research (see e.g. Audretsch, 1998; Asheim and Gertler, 2005). Fourth, the importance of particular location factors is surveyed at various spatial levels, including the effects of tax incentives (see e.g. Buss, 2001), of agglomeration externalities (see e.g. Fujita and Thisse, 2013), of transport infrastructure (see e.g. Holl, 2004), or of site attributes (see e.g. De Sousa, 2000).

This paper is embedded in the fourth strand of the research on location of economic activities. In particular, we are interested in the relations between selected site attributes on the one hand and functional use of enterprise zones in a metropolitan area on the other. Others said, this paper deals with the location of economic activities at the micro-spatial level through selected characteristics of four types of sites:

1. Brownfields as the sites which have lost their previous functional use
2. Stable sites without substantial changes in their functional use
3. Redeveloped sites as the sites which had lost their previous functional use but were newly reused
4. Newly developed greenfields sites

The goal of this paper is to identify differences between the four types of sites with a special focus on brownfield redevelopment, using the Ostrava metropolitan area as a model territory. In this regard, we map the changes in functional use of sites in the model territory after the fall of communism in 1989. Note that the Ostrava metropolitan area belongs to traditional industrial regions which have been seriously affected by societal transformation after 1989 (see e.g. Vojvodíková, Potužník and Bürgermeisterová, 2011). Thus, the choice of the model territory is very suitable for the purpose of our research. Moreover, we regard the goal of this paper as relevant to understand location of economic activities at the micro-spatial level. In this respect, the differences between brownfields, redeveloped sites, and newly developed greenfields sites show the preferences in the location strategies based on brownfield redevelopment on the one hand and newly developed greenfields sites development on the other. In addition, the characteristics of stable sites show their potential for location of economic activities, including the threat to become a brownfield. The paper is structured as

follows. The second chapter provides a theoretical insight into the relations between location factors on the one hand and brownfields, redeveloped sites and newly developed greenfields sites on the other. The third chapter introduces the methodology. The fourth chapter summarizes main empirical findings and these are further discussed in the fifth chapter. The last chapter concludes.

2. Literature review

As already mentioned, location of economic activities is closely related to different contexts. This article is embedded especially in the context of location factors. We understand location factors as the characteristics of a territory which influence location behaviour of economic subjects. There are a number of studies which dealt with this issue. Thus, Ellram, Tate and Petersen (2013) or Galan, Gonzalez-Benito and Zuniga-Vincente (2007) explored the factors that affect location behaviour of economic entities in their choice between countries. Damborský and Wokoun (2010) realized the same research on the country level. Questionnaire surveys were used to identify the importance of particular location factors in these studies. On the contrary, Mayer (2004), Pusterla and Resmini (2007) or Somlev and Hoshino (2005) tested location models on the basis of real location of economic entities. However, such a complex research of location factors is more typical for larger territories (e.g. countries, regions). It is rather scarce at the micro-spatial level of particular sites, including the relations between location factors on the one hand and brownfields, redeveloped sites and newly developed greenfields sites on the other (see e.g. Novosák et al., 2013) – the subject of interest of this paper.

The relations between location factors on the one hand and brownfields, redeveloped sites and newly developed greenfields sites on the other may be embedded in the discussion on the redevelopment barriers of brownfields. A number of studies explained the reason why brownfields were perceived as disadvantaged in the location behaviour of economic entities (see e.g. Frantál et al., 2013; Winkler and Kriebel, 1992; Sikamäki and Wernstedt, 2008; Ferber and Grimski, 2002; Adams et al., 2001; De Sousa, 2000). Besides non-location factors, such as low perception of the brownfield problem (e.g. Schultz and Dosch, 2005) or ill-defined brownfield policy, there is a number of brownfield redevelopment barriers which are closely related to characteristics of particular sites.

Location of brownfields in morphogenetic zones of metropolitan areas influences their redevelopment potential. In this regard, Frantál et al. (2013) or Lange and McNeil (2004) claim that peripherality, understood as proximity to city/regional centre, has an impact on

brownfield redevelopment. Moreover, Sýkorová (2007) and Novosák et al. (2013) speak about a more complex spatial picture. They claim that inner city and metropolitan hinterland are the morphogenetic zones with the highest spatial concentration of brownfields. It is noteworthy that the location of brownfields in inner cities is often connected with a limited space for expansion and complicated transport accessibility (e.g. Koll-Schretzenmayr, 2000). Similarly, peripheral location of brownfields in the metropolitan hinterland is closely related to poor transport accessibility. Finally, Sýkora (2003) regards city centres and suburban zones as the morphogenetic zones with the highest dynamics of changes in post-socialist cities.

There is no consensus on the importance of brownfield size for brownfield redevelopment potential. Frantál et al. (2013) argue that a large size of brownfields may not to be a determinative barrier of their regeneration. Similarly, Doetsch, Rüpke and Burmeier (1997) claim that large investors tend to prefer relatively large sites. On the contrary, brownfields are often located in urban areas of low socio-economic status (see e.g. Greenberg, 2003). Naturally, such a location reduces their redevelopment potential. The legacy of former use is further mirrored in two important barriers of brownfield redevelopment:

- First, brownfields are often connected with intricate ownership structure (e.g. Koll-Schretzenmayr, 2000). In this regard, owners are often reluctant to sell their properties because of their undue notion of brownfields value or for various other reasons (see e.g. Adams et al., 2001).
- Second, brownfield redevelopment potential may be affected by the uncertainty of environmental burden. Consequently, brownfield redevelopment projects are more risky and costly (e.g. Bartsch, 1999; Nijkamp, Van der Burch and Vindingi, 2002).

Despite the vast literature on brownfield redevelopment barriers related to characteristics of particular sites, there is rather scarce research on complex interactions between these characteristics embedded in location behavior of economic entities. There are some notable exceptions that especially dealt with the brownfield-greenfield relations (e.g. De Sousa, 2006; Sherk, 2001). Moreover, Novosák et al. (2013) analyzed the differences between brownfields and redeveloped sites in the Ostrava metropolitan area. In this regard, this paper represents an extension of their findings considering the differences between four types of sites (brownfields, stable enterprise zones, redeveloped sites, and newly developed greenfields sites).

3. Methodology

A complex methodological approach was applied to meet the goal of this article. Note that all details of the methodology may be found in Novosák (2009) and that a similar methodological approach was used in Novosák et al. (2013). Here, we introduce the most important aspects of the methodology.

First, we defined the key terms of the article – brownfields, stable sites, redeveloped sites, and newly developed greenfields sites. In this regard, four characteristics of particular sites were of relevance for us:

1. Two characteristics were common for all the four types of sites – the requirement of area size larger than one hectare and a limited set of functional uses (agricultural, mining, industrial, transportation, military and other non-residential functional uses except dumps and selected public facilities).
2. The third characteristic was the degree of functional use of particular sites in the period 2008-2009. This characteristic was relevant in distinguishing between brownfields on the one hand and the other three types of sites on the other. Brownfields were identified on the basis of ownership structure and physical deterioration. A total ownership share of entities active on the site below 50 % of its area was required to classify the site as brownfield.
3. The fourth characteristic was the change in economic activities realized on particular sites between the early 1990s and the period 2008-2009. This characteristic was relevant in distinguishing between stable sites, redeveloped sites, and newly developed greenfields sites. Thus, a site was understood as redeveloped if the entities active thereon in the early 1990s were not dominant employers in the early 1990s. Otherwise, such a site was classified as a stable site. Finally, there were no economic activities on newly developed greenfields sites in the early 1990s.

Second, we defined the Ostrava metropolitan area as the model territory of our research. In this regard, we analyzed functional links between the Ostrava City and surrounding municipalities on the basis of daily employment commuting, administrative links, and urban mass public transport connections. In this way, the model territory consisting of the administrative area of Ostrava City and thirty one municipalities in its hinterland was delimited.

Third, we created a data matrix for our further analysis. Thus, we compiled a database of sites larger than one hectare, which were used for any of the above-mentioned functional uses in the early 1990s or in 2008-2009. Subsequently, we added values of analyzed attributes

(location factors) for all identified sites. Table 1 summarizes these attributes and their possible values. Note that our analysis is based on categorical values of the attributes.

Table 1: Review of analyzed attributes

Attribute	Values
Location in morphogenetic zones of the model territory	<ol style="list-style-type: none"> 1. Zone of transition 2. Zone of housing estates 3. Compact inner city zone 4. Dispersed inner city zone 5. Suburban zone in the Ostrava city 6. Zone of surrounding municipalities
Socioeconomic status of the surrounding area derived from the unemployment rate and education structure of local inhabitants (Source: authors' calculations based on data from the Census 2001 for the lowest territorial units)	<ol style="list-style-type: none"> 1. Low 2. Average 3. High
Site area (Source: authors' compilation based on data from the cadastre – available from http://nahlizenedokn.cuzk.cz)	<ol style="list-style-type: none"> 1. Small – less than 5 ha 2. Medium – 5 -10 ha 3. Large – more than 10 ha
Ownership structure derived from the number of owners and their shares in total site area (Source: authors' calculations based on data from the cadastre – available from http://nahlizenedokn.cuzk.cz)	<ol style="list-style-type: none"> 1. Not complicated 2. Complicated 3. Very complicated
Transport accessibility (Source: authors' calculations of distances based on vector maps of communication – available from http://geoportal.cenia.cz)	<ol style="list-style-type: none"> 1. Very good – direct connection to highways 2. Good – direct connection to the first class road 3. Bad – direct connection to the second or third class road 4. Very bad – other cases
Threat of environmental burden derived from the former functional use and existence of environmental burden in official databases (Source: authors' compilation based on various cartographic and archival resources for particular sites and system of contaminated sites, available from http://sekm.cenia.cz)	<ol style="list-style-type: none"> 1. Low 2. Medium 3. High 4. Extremely high

Source: adapted from Novosák (2009) and Novosák et al. (2013)

Fourth, we evaluated the data matrix. Two methodological approaches were used:

1. Traditional methods of descriptive and inferential statistics (analysis of frequencies, Pearson's Chi-square and Cramer's V statistics) were used for our decisions on differences between the four types of sites. Differences were related both to the number of sites and their total area.
2. Broader relations between the evaluated attributes on the one hand and brownfields, redeveloped sites, and greenfields sites on the other were analyzed by the rough-set method. This method provides a robust theoretical framework for the interpretation of information of quantitative and qualitative nature (see e.g. Pawlak, Slowinski, 1994; Bruinsma, Nijkamp, Vreeker, 2002). In this article, this method was used to generate the

so called “if-then” decision rules. The “if part” contains conditions – a combination of the values of attributes. The “then part” is a decision conditioned by the combination. Thus, we deal with the question what combinations of values of attributes classify sites as brownfields, redeveloped sites and newly developed greenfields sites.

4. Empirical results

Our empirical results are based on a sample of 295 sites. These include 74 brownfields with a total area of 699 hectares, 80 stable sites with a total area of 1,534 hectares, 107 redeveloped sites with a total area of 529 hectares and 34 newly developed greenfields sites with a total area of 166 hectares. Tables 2, 3, 4, 5, 6 and 7 show the structure of brownfields, stable sites, redeveloped sites, and newly developed greenfields sites according to the six analyzed attributes. Both, the number of sites and their total area are evaluated. The main findings may be summarized as follows.

There is a relatively high number of brownfields in the inner city zones and in the zone of surrounding municipalities. However, these morphogenetic zones differ in the total area of their brownfields. Thus, the compact inner city zone is characteristic by the presence of large brownfields. On the contrary, small brownfields are typical for the zone of surrounding municipalities. Furthermore, there is a relatively high number of newly developed greenfields sites in the suburban zone and in the zone of surrounding municipalities. Large greenfields sites were developed also in the zone of housing estates, especially as new retailing projects. Finally, the presence of very large stable sites in the inner city zones is noteworthy. The decay of these sites may be perceived as a threat in the future (see table 2).

Table 2: Brownfields, stable sites, redeveloped sites and newly developed greenfields sites in the model territory – location in morphogenetic zones; number of sites and their area in hectares

Morphogenetic zones	Brownfields		Stable sites		Redeveloped sites		Newly developed greenfields sites	
	Number	Area	Number	Area	Number	Area	Number	Area
Zone of transition	6	38.9	6	12.9	11	33.0	1	2.9
Zone of housing estates	2	9.9	6	25.0	8	28.2	5	31.6
Compact inner city zone	11	270.9	20	466.5	15	95.1	3	14.7
Dispersed inner city zone	14	134.4	16	730.6	24	143.8	7	29.8
Suburban zone	13	71.2	10	58.7	22	113.3	11	61.1
Surrounding municipalities	28	173.5	22	239.8	27	115.4	17	25.6

Source: authors' calculations (based on Novosák, 2009)

Table 3 and table 4 emphasize especially two differences between brownfields, stable sites, redeveloped sites, and newly developed greenfields sites. First, there is a relatively high number of large brownfields in the areas of low socioeconomic status (see table 3). Second, large sites are more likely to be brownfields than small sites (see table 4).

Table 3: Brownfields, stable sites, redeveloped sites and newly developed greenfields sites in the model territory – socioeconomic status of the surrounding area; number of sites and their area in hectares

Socioeconomic status	Brownfields		Stable sites		Redeveloped sites		Newly developed greenfields sites	
	Number	Area	Number	Area	Number	Area	Number	Area
Low	28	429.1	16	293.3	34	152.0	6	37.7
Average	35	223.5	51	1,175.9	57	320.9	22	114.5
High	11	46.2	13	64.3	16	55.9	6	13.5

Source: authors' calculations (based on Novosák, 2009)

Table 4: Brownfields, stable sites, redeveloped sites and newly developed greenfields sites in the model territory – site area; number of sites and their area in hectares

Site area	Brownfields		Stable sites		Redeveloped sites		Newly developed greenfields sites	
	Number	Area	Number	Area	Number	Area	Number	Area
Small	42	103.6	38	100.0	72	171.9	22	51.2
Medium	16	113.8	25	176.6	21	155.6	8	50.5
Large	16	481.4	17	1,256.9	14	201.3	4	64.0

Source: authors' calculations (based on Novosák, 2009)

Tables 5, 6 and 7 add other pieces to the mosaic enabling the overall picture to become clearer. First, especially large brownfields are more likely to have very complicated ownership structure (see table 5) and to be the sites with extremely high threat of environmental burden (see table 7). The opposite is true for newly developed greenfields sites (see table 5 and 7). Furthermore, there are a relatively high number of brownfields with bad or very bad transport accessibility. However this characteristic is more typical for small brownfields. Once again, the sites with very good transport accessibility are more likely to be newly developed greenfields sites than the sites with very bad transport accessibility (see table 6).

Table 5: Brownfields, stable sites, redeveloped sites and newly developed greenfields sites in the model territory – ownership structure; number of sites and their area in hectares

Ownership structure	Brownfields		Stable sites		Redeveloped sites		Newly developed greenfields sites	
	Number	Area	Number	Area	Number	Area	Number	Area
Not complicated	30	173.7	56	540.2	51	182.1	32	137.2
Complicated	26	161.7	16	830.1	41	216.0	2	28.5
Very complicated	18	363.4	8	163.2	15	130.7	0	0.0

Source: authors' calculations (based on Novosák, 2009)

Table 6: Brownfields, stable sites, redeveloped sites and newly developed greenfields sites in the model territory – transport accessibility; number of sites and their area in hectares

Transport accessibility	Brownfields		Stable sites		Redeveloped sites		Newly developed greenfields sites	
	Number	Area	Number	Area	Number	Area	Number	Area
Very good	12	299.6	13	239.2	10	60.0	16	78.1
Good	12	111.1	25	332.4	28	146.3	13	57.3
Bad	34	198.3	29	907.6	54	279.0	15	16.0
Very bad	16	89.9	13	54.3	15	43.5	2	14.3

Source: authors' calculations (based on Novosák, 2009)

Table 7: Brownfields, redeveloped sites and newly developed greenfields sites in the model territory – threat of environmental burden; number of sites and their area in hectares

Threat of environmental burden	Brownfields		Redeveloped sites		Newly developed greenfields sites	
	Number	Area	Number	Area	Number	Area
Low	31	136.7	53	208.1	31	141.2
Medium	14	122.0	31	152.5	0	0.0
High	4	24.7	12	101.2	0	0.0
Extremely high	25	415.4	11	67.0	3	24.5

Source: authors' calculations (based on Novosák, 2009)

5. Discussion

The preceding chapter revealed the main differences between brownfields, stable sites, redeveloped sites, and newly developed greenfields sites in the model territory according to the six analyzed attributes. To verify our assumptions we employed two methodological approaches. First, we statistically tested the significance of differences between brownfields, stable sites, redeveloped sites, and newly developed greenfields sites for each of the six attributes (see table 8). Second, we constructed the most common combinations of the values of attributes using the rough-set method (see table 9).

Table 8: Statistical significance of differences between brownfields, stable sites, redeveloped sites, and newly developed greenfields sites – analyzed attributes; asymptotic significance of Pearson Chi-square

Attributes	All sites		Without brownfields	
	Pearson Chi-square	Cramer's V	Pearson Chi-square	Cramer's V
Location in morphogenetic zones	0.124	0.168	0.177	0.177
Socioeconomic status of the surrounding area	0.189	0.122	0.323	0.103
Site area	0.156	0.126	0.089	0.135
Ownership structure	0.000*	0.260	0.000*	0.247
Transport accessibility	0.001*	0.180	0.001*	0.224
Threat of environmental burden	0.000*	0.398	0.000*	0.453
Attributes	Without redeveloped sites		Without newly developed greenfields sites	
	Pearson Chi-square	Cramer's V	Pearson Chi-square	Cramer's V
Location in morphogenetic zones	0.056	0.219	0.394	0.142
Socioeconomic status of the surrounding area	0.086	0.147	0.174	0.110
Site area	0.375	0.106	0.079	1.127
Ownership structure	0.000*	0.294	0.001*	0.260
Transport accessibility	0.003*	0.203	0.149	0.135
Threat of environmental burden	0.000*	0.529	0.000*	0.456

* Statistically significant at 1% level of significance

Source: authors' calculations (based on Novosák, 2009)

Table 8 summarizes the results of the first methodological approach. There are three statistically significant variables at 1% level of significance – ownership structure, transport accessibility and the threat of environmental burden. In the preceding chapter, brownfields were described as the sites which were more likely to have very complicated ownership structure, worse transport accessibility and extremely high threat of environmental burden. The opposite was true for greenfields. Table 8 confirms the significance of these assumptions. Nevertheless, it is shown that transport accessibility is a typical feature especially of newly developed greenfields sites because the differences between brownfields, stable sites, and redeveloped sites are not statistically significant. The variables location in morphogenetic zones, socioeconomic status of the surrounding area, and site area are not statistically significant. However, the variable socioeconomic status of the surrounding area seems to be important for brownfields, the variable location in morphogenetic zones for newly developed greenfields sites and the variable area for redeveloped sites. Thus, there is a relatively high number of brownfields in the areas with low socioeconomic status, of newly developed

greenfields sites in the suburban zones and in the zone of surrounding municipalities and of small redeveloped sites.

In the second methodological approach, we used the rough set method to explore broader relations in the data matrix. The six analyzed attributes were defined as independent variables. The dependant variable provided the choice between brownfields, redeveloped sites and newly developed greenfields sites. Applying the rough-set method, the “if – then” decision rules were generated. Subsequently, we observed what combinations of independent variable values unambiguously classified sites as brownfields, redeveloped sites and newly developed greenfields sites.

Table 9 shows the decision rules with the highest number of classified brownfields, redeveloped sites and newly developed greenfields sites. The results show that there are two fundamental types of brownfields in the model territory. The first type of brownfields is characteristic by peripheral location in the zone of surrounding municipalities, by very complicated ownership structure and by low threat of environmental burden (DR3). The last characteristic is closely related to former agricultural functional use of these sites. Moreover, Novosák et al. (2013) point at the close relationship between former agricultural functional use of brownfields on the one hand and their intricate ownership structure due to restitution processes on the other. Large brownfields located in the compact inner city zone is the second type of brownfields (DR6 and DR11). In addition, low socioeconomic status of the surrounding area and extremely high threat of environmental burden further worsen the development potential of several brownfields of this type (DR6). It is noteworthy that very good transport accessibility is not sufficient assumption for a redevelopment of this type of brownfields (DR11).

Besides the two types of brownfields, table 9 shows that there is a high number of newly developed greenfields sites with good transport accessibility, low threat of environmental burden and not complicated ownership structure (DR12, DR13, and DR14). These sites are located either close to large housing estates (DR13) or in the areas with low built-up density (DR12). Thus, this issue is highly relevant in the discussion on the compact and dispersed city.

There are several decision rules that classify redeveloped sites. In this regard, the location of these sites in the dispersed inner city zone (DR1, DR4, DR8, and DR9) and the suburban zone (DR7) in the Ostrava City seems to increase the redevelopment potential of brownfields. This is true also if a site is located in an area of a higher socioeconomic status and if there are rather low threats of environmental burden. In addition, there is a rather high development

potential of the sites that are located in the zone of transition close to the Ostrava City centre and that have good transport accessibility (DR5). Thus, the area close to city centre and the suburban zone show a high redevelopment dynamics in the model territory (compare with Sýkora, 2003).

Tab. 9: The number of sites classified by “if – then” decision rules; brownfields, redeveloped sites, and newly developed greenfields sites; the decision rules with the highest number of unambiguously classified sites

Rule	Combination of independent variable values	Decision	Number
DR1	LMZ = 4 and SES = 1 and AR = 2	Redeveloped sites	7
DR2	SES = 1 and AR = 1 and TEB = 2	Redeveloped sites	7
DR3	LMZ = 6 and OS = 3 and TEB = 1	Brownfields	7
DR4	LMZ = 4 and SES = 2 and TA = 3	Redeveloped sites	6
DR5	LMZ = 1 and TA = 2	Redeveloped sites	6
DR6	LMZ = 3 and SES = 1 and AR = 3 and TEB = 4	Brownfields	5
DR7	LMZ = 5 and SES = 2 and OS = 2	Redeveloped sites	5
DR8	LMZ = 4 and SES = 2 and TEB = 2	Redeveloped sites	5
DR9	LMZ = 4 and OS = 2 and TA = 3 and TEB = 1	Redeveloped sites	5
DR10	OS = 3 and TEB = 3	Redeveloped sites	5
DR11	LMZ = 3 and AR = 3 and TA = 1	Brownfields	4
DR12	LMZ = 4 and AR = 1 and OS = 1 and TA = 2 and TEB = 1	Greenfields sites	4
DR13	LMZ = 2 and TA = 2	Greenfields sites	3
DR14	SES = 2 and AR = 1 and TA = 1	Greenfields sites	3

Note: LMZ = location in morphogenetic zones; SES = Socioeconomic status of the surrounding area; AR = site area; OS = ownership structure; TA = transport accessibility; TEB = threat of environmental burden
Source: authors' calculations (based on Novosák, 2009)

6. Conclusion

The goal of this paper was to identify differences between brownfields, stable sites, redeveloped sites, and newly developed greenfields sites in the Ostrava metropolitan area. We considered these differences as relevant for thinking on location behaviour of economic entities on the micro-spatial level. We selected six attributes – location factors – for our research – location in morphogenetic zones, socioeconomic status of the surrounding area, site area, ownership structure, transport accessibility, threat of environmental burden.

Three of these attributes are identified as statistically significant in explaining differences between brownfields, stable sites, redeveloped sites, and newly developed greenfields sites, in particular ownership structure, transport accessibility, and threat of environmental burden. Thus, it is confirmed that not complicated ownership structure, good transport accessibility

and low threat of environmental burden are important factors in location strategies based on the development of greenfields sites and simultaneously important barriers of brownfield redevelopment. However, the rough-set model showed that the overall picture is much more complex. Thus, the decision rule DR10 classifies the sites with complicated ownership structure and high threat of environmental burden as redeveloped sites.

We regard the brownfield issue as the most important aspect of our research from the political point of view. Brownfields redevelopment is generally perceived as desirable from economic, social and ecological reasons. Our findings point at the existence of two types of brownfields in the model territory. First, there are large brownfields located in the compact inner city zone. The development potential of these sites is limited and in several cases further worsened by intricate ownership structure and extremely high threat of environmental burden. Second, there are rather small brownfields located in the peripheral areas of the model territory. The development potential of these brownfields is also affected by their complicated ownership structure. In our opinion, public interventions are highly desirable especially for redevelopment of these sites. It is noteworthy that there are several large stable sites with the same characteristics as the first type of brownfields. This is a dormant brownfield threat for the Ostrava metropolitan area. Finally, there are substantial differences between brownfields on the one hand and newly developed greenfields sites on the other. In our stance, these results support the thesis that brownfields and greenfields are two partial real estate submarkets (see e.g. Sherk, 2001).

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