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Published by DRUNPP, Sarajevo
Volume 6 Number 2, 2011
ISSN 1840-1503

Indexing on:

Science Citation Index Expanded EBSCO Publishing (EP) USA
<http://www.isiwebofknowledge.com> <http://www.epnet.com>





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Brownfield redevelopment versus Greenfield investment - Case study Ečka industrial zone in Zrenjanin, Serbia

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Abstract

The paper discusses how different investment types affect the transformation of the urban environment. In the narrow sense, the research subject is the comparative analysis of the effects produced by Brownfield sites regeneration versus Greenfield investment. An example that illustrates the relation between these investment kinds is Ečka industrial zone in Zrenjanin.

The central part of the paper presents the comparative study of the positive and negative effects as the result of Greenfield and Brownfield investments. The main parameters for the analysis of the mentioned investments are determined in accordance with the aspects of sustainable development - specially economic, social and environmental aspect of sustainable development. In terms of urban planning, Brownfield and Greenfield investments primarily differ by the activity distribution and infrastructure equipment. This implies that the positive effects which arise as the result of Greenfield investments are the primary deficiencies of Brownfield regeneration and vice versa. Therefore, the analysis of the sustainable development aspects is presented in the form of an argumentative essay, with the comparison of positive and negative parameters. The paper aims to show how and to what extent can Brownfield site be successfully revitalized in comparison with Greenfield site investment.

The last part of the paper is given in the form of final conclusions. The subject of some further research can be based on the analysis of only one among several aspects offered, all in order to understand the needs of the modern city and facilitate its further development.

Key-words: Brownfield redevelopment, Greenfield investments, sustainable city planning, Serbian industrial zones

Sazetak

U radu se razmatra na koji način različiti oblici investicija utiču na transformaciju urbanog okruženja. U užem smislu, predmet istraživanja je uporedna analiza efekata koje proizvodi regeneracija braunfild lokacija naspram grinfild investicija. Kao primer koji ilustruje relaciju pomenutih oblika investicija prikazana je studija slučaja industrijske zone Ečka u Zrenjaninu.

Tema centralnog segmenta rada je uporedno istraživanje pozitivnih i negativnih efekata grinfild, odnosno braunfild investicija. Osnovni parametri na osnovu kojih se vrši analiza braunfild i grinfild investicija su određeni u skladu sa aspektima održivog razvoja grada i to ekonomskim, socijalnim i ekološkim aspekt održivog razvoja. U urbanističkom smislu grinfild i braunfild investicije razlikuju se, pre svega, po lokacionoj distribuciji aktivnosti i infrastrukturnoj opremljenosti. Odatle

proizilazi da pozitivni efekti koji nastaju kao rezultat grinfild investicija predstavljaju osnovne nedostatke braunfild regeneracije i obrnuto. Stoga će analiza aspekata održivog razvoja biti prikazana u formi argumentativnog eseja, sa uporednim prikazom pozitivnih i negativnih parametara. Cilj rada je da pokaže na koji način i u kojoj meri se može uspešno revitalizovati centralna gradska braunfild lokacija, nakon čega sledi poređenje ovog oblika intervencije u prostoru sa rezultatima koji nastaju investiranjem u grinfild lokacije.

Kako je ovaj prikaz dat u formi pregleda sinteznih zaključaka nastalih analizom pomenutih principa, neka od budućih istraživanja se mogu baviti studioznom analizom samo jednog od nekoliko ponuđenih aspekata razmatrane teme, a sve u cilju razumevanja potreba savremenog grada i omogućavanja njegovog daljeg razvoja.

Ključne reči: urbana regeneracija braunfilda, grinfild investicije, održivo planiranje, industrijska zona, Srbija

1. Introduction

1.1. The topic relevance - Ecka industrial zone as the example of the Greenfield investment

The different trends in the city development were changing during the previous decades. The generators of this development belonged to different realms, and, therefore, their spatial manifestations differed. However, in the new millennium the success of urban development can be measured by the sustainability of the city. Most contemporary authors agree that this sustainability can be achieved by the balance of the basic urban development drivers. According to Peter Hall: "There will emerge a new golden age for those cities that can offer innovation at three independent levels: culture, economics and urban organization (...) In the global competition between metropolitan regions those that are creative in all three fields will survive" (Hall, 2001). However, the fact is that the undisputed requirements for the successful economic development of the society are more dominant than other parameters, which can be seen on the example of the urban sprawl. According to the same source, the raising of com-

pletely new properties in sparsely populated terrain is understood as economical one, so that we can talk not only about urban qualities decline in the city centre, but in the whole city (Hall, 2001a). Due to the development of global economy and new information technologies, the transformation of cities into faceless phenomena is present as well. As Manuel Castells points out, this leads to the deterioration of the historical heritage, as the holder of the city culture enrichment and its identity (Castells, 2001).

According to Zaklina Gligorijevic (2007), this trend of urban development is particularly seen in the transition countries which are interesting for investment and development due to:

- The lack of adequate legal and financial framework of business and investment (unknown capital origin, unfavorable credit terms, relying on benefits through the corruption in all sectors, etc.);
- The cheap undeveloped suburban land which is to be built;
- The affordable privatization of state-owned enterprises within the central urban sites;
- The large inflow of capital of different origin from the region.

The developers who agree with such a framework have no patience for the introduction of the strategies in the city planning and management, nor for any long-term land, urban and environmental policies which require long-term analysis. The result of this situation is building intensifying on the unbuilt sites - Greenfield.

From the urban aspect, Ecka industrial zone in Zrenjanin fits very well into the current urban trends. In fact, it is the typical example of Greenfield investment. Firstly, if we stick to area and functional analysis, its placement is planned outside the central city area, precisely on the unused green area, where no previous activities were found. Secondly, from the aspects of physical structure, the facade of the Greenfield facilities meets the highest standards. These buildings are the result of a global high technology in the facade design.

As an alternative to Greenfield investments, there is the regeneration of Brownfield sites.¹ It is important to explain the difference in the mentioned term understanding. In architecture and

urban planning the concept of Brownfield is in regard with the facility rehabilitation and reconstruction, or the wider environment, while economists understand Brownfield as investment in the already constructed building, with existing infrastructure, for which exploitation is necessary to invest less money compared to investing in the new facility. The regeneration of Brownfield sites has completely opposite goals from those which are the expression of the modern urban trends. In fact, the regeneration involves the mechanisms that aim to preserve the city integrity, without creating so-called satellite settlements. Also, the regeneration takes a key role in the creating a recognizable “image of the city”. The following paragraphs discuss the basic parameters for the comparative analysis of Brownfield and Greenfield investments.

1.2. The general characteristics of the Ecka site in Zrenjanin

The proposed area for development is located on unused Greenfield site within the peripheral zone of the city of Zrenjanin, which is the administrative centre of Central Banat district. The zone is 8 km far from the city centre and covers an area of 72 hectares, where the entire area is held by the municipality. The project of the new industrial zone in Zrenjanin can be seen as the result of some previous actions in regard to the new investment within the Zrenjanin city. Actually, one project was successfully implemented when the plans for the Ecka industrial zone started. The preliminary assumption was in regard with the strong demands for industrial areas close to Zrenjanin, so municipality could acquire the reputation of the one which supports the investments without tax and with the low-cost labor force. This was an initiative to make a detailed “Municipal Strategy for Sustainable Development” which was prepared and adopted for the period 2005-2013 (MSP-NE, 2008). An integral and critical element of this strategy was the focus on the local economy development, underpinned by the creation of two special taxation business and industrial zones. As the result of this strategy a new special taxation business zone in the area of Bagljas directly adjacent to the town of Zrenjanin has been established.

The occupancy of this zone has reached its limits with a total of 14 companies. In response to this the municipality decided and adopted a remote area Ecka to create the second industrial zone. The extensive investments in project preparation, which includes land acquisition, expropriation of occupants, technical projects, building permits and other preparatory expenses, the municipality has carried out with financial support from the National Investment Plan.

1.3. The importance of case study Ecka for the comparative analysis of Brownfield and Greenfield investments

The main parameters for the analysis of Brownfield and Greenfield investments are determined in accordance with the basic aspects of the sustainable city development. Thus, the basic parameters for the analysis are economic, social and environmental aspect of sustainable development. The following paragraph describes the crucial characteristics of Ecka site, from the previously mentioned point of view:

1. From an economic aspect, the spatial distribution of the Ecka industrial zone outside the urban core is fully adequate, for the use of central urban areas for commercial purposes is possible in this way.
2. The social aspect of industrial zone in terms of high technology use has a positive effect on job creation. In addition, its spatial distribution in the peripheral part of the city has a positive effect on the city as a whole, since the attractive activities can be positioned within the central urban areas, making it possible to attract more users.
3. From an ecological point of view, the area with higher environmental risk, which is certainly the case with the industrial zone, should be located at the appropriate distance from the city centre and residential zones. Increased mobility in order to access this site, compared to the previously mentioned environmental risk, is of the secondary importance.

The analysis of these aspects leads to the conclusion that Ecka industrial zone as a typical ex-

ample of the Greenfield investment has the number of positive effects on the environment in its vicinity. However, the central segment of the work shows all the positive and negative consequences of Greenfield investments, with the comparative analysis of the Brownfield regeneration, as an alternative to the new building.

2. The overview of the positive and negative effects of the Greenfield investments - example of Ecka industrial zone in Zrenjanin

The central part of the study illustrates the positive and negative effects of Greenfield investments. The comparison consists of several stages, which include three aspects of the sustainable city development, as well as technical aspect. The aspects are chosen on the analogy with the fundamental aspects that are discussed in the "Municipal Strategy for Sustainable Development"², which was adopted by Zrenjanin local government. In terms of urban planning, Greenfield and Brownfield investments differ primarily by the activities distribution and infrastructure equipment, so all other aspects will be analyzed through the prism of the aforementioned urban parameters. Hence it follows that the positive effects resulting from Greenfield investments are the main disadvantages of Brownfield regeneration and vice versa. Therefore, each of the parameters for the comparative analysis will be considered by the aforementioned model. The aim of the study is to show how and to what extent can the Brownfield site be successfully revitalized in comparison with Greenfield site investment.

2.1. The technical aspect of Greenfield investments

When it comes to technical advantages for the realization of Greenfield and Brownfield investments, it is necessary to mention three basic parameters for the comparative analysis. The parameters such as land, infrastructure and facilities will be considered in the next paragraphs.

1. Land. The first parameter for analysis is the land and its quality and capacity for further building. As Brownfield investment includes the construction on the terrain with the physical structure previously built, the logical conclusion is that there is no need for additional testing the quality of land for new construction. On the contrary, we often do not know whether it is possible to build on Greenfield site, because those are the areas with no previously built structure. Therefore, the thorough analysis of terrain is necessary, which causes higher costs and longer timeframe for the realization of Greenfield investments. However, according to data listed in the "Feasibility Study of Zrenjanin", in the case of Ecka industrial zone all terrain performances are within acceptable limits for construction - the terrain is flat with a stable ground³, suitable for the construction of industrial facilities (MSP-NE, 2008, p. 106).

2. Infrastructure. The comparison of Greenfield and Brownfield investments benefits on the basis of infrastructure parameters provides ambivalent results. In fact, as the Brownfield sites are equipped with the existing infrastructure, we can conclude that this significantly reduces the costs of building. The further construction is in regard to the facilities only. Also, the advantage of Brownfield regeneration can be seen in the fact that those sites are located in the central city zone, equipped with all the kinds of infrastructure which is wired at the city infrastructure network. It is meaningful to show statistics from the one study conducted in the US, which is based on universal economic parameters, independent of socio-economic situation of the state in which they arise, so it can be successfully applied for the purposes of this study. The following data show the difference in value of investments in Brownfield and Greenfield sites:

- Infrastructure costs of Brownfield sites are 7.5 per cent smaller than those which are necessary for the construction of the new infrastructure network;
- The length of the newly built road in urban areas is 4.5 m/capita versus 6.8 m/capita at the town outskirts, or 19.4 m/capita in rural areas;
- The maintenance of roads in urban areas amounts \$ 12 million a year versus \$ 50 million in rural areas (Whittemore, 2003?).

As stated at the beginning of the study, Ecka industrial zone is planned on the land which belongs to the category of agriculture. This means the mentioned location is necessary to equip with the adequate infrastructure services which require the following technical components:

- Water supply network: construction of water supply distribution network and its connection to the main city water supply;
- Sewage network: construction of fecal sewage system for the site and outlets towards the future Waste Water Treatment Plan;
- Wastewater network: building of wastewater collection network and construction of discharge piping for disposal of storm waters in the river Begej;
- Electrical network: removal of existing transmission line and replacement of the same by underground cable; construction of transformer substations and their connection to the public electrical system;
- A telecommunications network: construction of network and connection to the public network;
- Natural gas: connection to medium-pressure natural gas network and its distribution throughout the industrial zone;
- Road infrastructure: the construction of internal road network and connection to the main road (MSP-NE, 2008, pp. 83-84).

The previously mentioned characteristics of different locations are almost theoretical models and the true situation implies that the Brownfield sites do require additional investments in infrastructure. Specifically, the existing infrastructure on Brownfield sites is often out of appropriate use, according to the latest technical standards. Therefore, the first request is its removal, and then the installation of new infrastructure elements. This situation requires large investments that cannot have a financial support in only one investor, so the possibilities of organizing co-capital will be discussed more within the social aspects of Brownfield investments.

When it comes to the existing infrastructure equipment of Ecka industrial zone, it is not the same as for other Greenfield sites, because it is

located within the city of Zrenjanin or in the urban environment (MSP-NE, 2008, p. 107). This means there are present the simple forms of infrastructure, which implies the exploitation during the construction phase (the path that leads from the main road Belgrade-Zrenjanin inward location, the existing water supply network, the local gas system), but the second stage implies their removal and replacement by the new infrastructure, which is also provided for a new aerial and underground utility lines, electrical installations, new phone lines, new gas system and the municipal sewage system that has never existed on the site (MSP-NE, 2008, pp. 72-73).

As the site equipment includes the preparation of land for the construction and the provision of infrastructure⁴, it can be concluded that the costs of Ecka supplies are the same or even bigger than within Brownfield sites. In fact, this investment must include the cost of removing the original inadequate infrastructure, and then building the new one.

3. Facilities. When it comes to building new facilities, the Greenfield investment is a much easier task for several reasons. Firstly, the Brownfield sites are often occupied with the objects that are difficult to remove completely, and sometimes this is impossible, for the facilities in the city centre carry the historical heritage of the city, and as such their removal is forbidden. Also, the authorities (Institute for the Protection of Cultural Monuments) often explicitly require the permanent retention of these monuments and the adaptation of new structures to the existing physical structure, which further complicates construction. As there are no facilities within Greenfield sites, aside from the temporary ones, it is clear that construction process can start within these sites more easily. Ecka industrial zone is the typical example of Greenfield investment when looking at the parameter of existing site construction, for there are no registered cultural monuments or protected cultural and historical entities (MSP-NE, 2008, p. 63.).

Secondly, all infrastructure, installations and facilities within the Greenfield investments are designed in a full compliance with all the technical standards and norms, ie. techniques that are well known and common for the international and local construction companies. Brownfield investments are sometimes not applicable for the standard

technology, which further increases the cost, time limit, and sometimes requires the knowledge and techniques of expert teams from overseas. Also, at the very beginning of the Brownfield regeneration process it may not be easy to estimate the future costs due to possible soil contamination which can be determined only after the preliminary stage of terrain preparation. The result of this is the impossibility to estimate the quantities and prices that are necessary for the project realization. In the case of Ecka industrial zone the all planned works have been determined according to project standards, with precisely determined quantities and prices that provide the least cost options and precise timeframe for the completion of work within 20 months (MSP-NE, 2008, p. 69).

Another advantage of the building on Greenfield site is the flexibility of the functional capacity or the ability to meet current and future needs, which does not apply to the Brownfield site due to limited capacity. In the case of Ecka industrial zone the provided infrastructure systems are designed with enough capacity to support the construction of additional physical structure (MSP-NE, 2008, p. 14.).

2.2. The economic aspects of Greenfield investments

From the economic point of view there are several basic arguments which support the Brownfield regeneration versus the new building at the unconstructed land outside the central city core. However, the specific example of Ecka industrial zone illustrates the minimum of the negative effects within the Greenfield investments. It is important to note that the economic analysis in this study is considered as a simple cost-benefit analysis. The goal of this research is to determine which location requires more financial resources in order to facilitate its development.

First, according to Borislav Stojkov, investment in Brownfield site allows the development of the wider area surrounding it (Stojkov, 2007, p. 56.). This can be achieved by the increase in local revenue, strengthening the tax base and the added value of land. This makes the possibility that some of the unbuilt land becomes an ideal target for the

new investment, in contrast with the prevailing trend of the building on the city outskirts.

However, in terms of spatial distribution of the Ecka industrial zone, it is evident that the negative consequences of a typical Greenfield investment are minimal. In fact, the mentioned industrial zone is planned at the junction of multiple traffic flows with the different kinds of transportation:

- The location of the Ecka industrial zone is 8 km south-east from the city centre of Zrenjanin, next to the M24 road Belgrade-Zrenjanin, which is categorised as the main road. This road will also be used as a starting point of the future 15 km ring road planned to support industry in and around Zrenjanin;
- The railway route is to the north of the zone with the closest railway station at Zrenjanin (factory), 1500 m from the zone;
- The location of the zone in terms of waterways is close to the navigable canal Begej and planned “Goods Transportation Centre” with a modern port. Future tenants of the zone will be in a very favorable position to use this cost effective means of transportation;
- Ecka airport, which belongs to the C category and as such is the largest in the Balkans, is located near the Ecka industrial zone (MSP-NW, 2008, pp. 60-74).

From the previous, we can conclude that the city transport infrastructure⁵ is highly effective, so the example of the Ecka industrial zone requires no additional cost in terms of building the new communications. The easy access to major traffic flows provides the certain amount of exclusivity for the Ecka industrial zone. Actually, the location is well connected with the economic development centers in Belgrade, Novi Sad, the other cities of Banat, as well as Hungary and Romania, which is an advantage in the attracting investment process (MSP-NE, 2008, p. 107).

The second stance that supports the rebuilding of Brownfield sites, according to Borislav Stojkov, is the fact that Brownfield re-usage helps creating a sustainable urban environment (Stojkov, 2007, p. 58.). This can be explained by the quality of the location - its position in the inner city core, and the lower risk of poor visit - in terms of mixed-use

buildings. Slavka Zekovic also points out that the Brownfield regeneration by the introduction of the activities that make the site attractive is important because of the local standard increase, as well as the greater attractiveness for the high-class population (Zekovic, 2007, p. 68). The same author argues about the unbreakable connection between the space transformation and the prevailing economic conditions within the community, which in Serbia, as a state under the pressure of global economic development and the transition of socio-economic system towards a market economy, "(...) has an impact on the formation of the new economic poles (space-economic clusters) in urban areas" (Zekovic, 2007, p. 61.). They directly affect the spatial changes - a positive effect for the city as a whole is achieved by revitalizing the existing Brownfield sites where the different purposes are introduced.

When using the abovementioned parameters for the analysis of Ecka industrial zone, we can conclude there are no disadvantages typical for the Greenfield investments. Dominant industrial activities on the site require a location outside the city centre, which is the case with the disposition of Ecka site in regard to the wider urban environment. Also, the requirements for the proper form of site and the necessary area to carry out activities in regard with industry can only be implemented within the Greenfield sites, because they provide enough capacity for these activities (MSP-NE, 2008, p. 84). When it comes to space-economic poles as the product of Greenfield site development, the negative effects of creating a dominant industry and business center in the case Ecka are avoided by the fact that the similar activities within the zone named Bagljas are formed in the north-western part of the town. Association to a common enterprise establishes the balance not only between these zones, but also with the central part of town.

Finally, the biggest disadvantage of Brownfield investments can be seen in the uncertainty of investment or the inability to estimate the final costs. Also, some experts believe that there is uncertainty of the capital return - the amount of money and time. According to some estimates, it takes more than ten years to see the obvious economic progress. The fact that demonstrates the effectiveness of Greenfield investments in economic terms is in re-

gard with the number of jobs which are expected to be started by activating the Ecka industrial zone. In fact, according to the studies that preceded the "Feasibility Study Zrenjanin", the demand for new jobs in the Zrenjanin municipality was 57.5 workplaces per hectare. Additional data may also be extrapolated directly from expressions of interest received from four companies which intend to occupy 7.9 hectares in the zone. These companies estimate that they will create 260 new jobs at the beginning of their operations leading to 310 new jobs at a full production (MSP-NE, 2008, pp. 14-15).

2.3. The environmental aspect of Greenfield investments

This part of the research is based on arguments that explain the Brownfield regeneration in comparison with the Greenfield investments, speaking from the environmental point of view. Environmental impact of Brownfield regeneration involves its effect on the nearest environment, and is manifested by the pollution of water, air, soil, and the effect on public health is important as well. On this occasion, the results of research conducted within the National Center for Neighborhood and Brownfield's Redevelopment (US) are shown, which is particularly important for the comparative analysis of advantages and disadvantages of Brownfield regeneration.⁶

As Michael Greenberg points out, the first advantage of Brownfield regeneration is the significantly improvement of the air quality in the city. This appears due to the reduction in the number of vehicles that are not necessary for the going over smaller distances, since the Brownfield regeneration in this study refers to the area of the inner city centre (A Brownfield category)⁷. Another advantage is the fact that the maintenance of a compact city, which is the result of the Brownfield redevelopment, requires significantly less energy, both for heating and cooling (Greenberg et al, 2001, p. 132.). However, when it comes to the Ecka industrial zone, it is important to emphasize that the proposed site, which is remote from the residential zone, is not the obstacle for the population (MSP-NE, 2008, p. 110). Also, there are no negative impacts on the environment due to the

proposed protection measures, which are primarily reflected in the protective greenery. The role of planting greenery in the zone is to curb the degree of possible contamination with toxic gases and smoke as the products of industrial activities, and to reduce their negative impacts on residential and agricultural zones. The protective greenery will be planted and formed in a broad protective belt along compound borders to hinder dominant wind forces. Linear greenery will be planted in land passages between plots and their location will be fully compatible with the planned and existing infrastructure (MSP-NE, 2008, p. 99).

As the following argument in favor of rebuilding within the existing urban areas, the same author considers the rational use of land, which is reflected in the preservation of existing ecosystems and open space (Greenberg et al, 2001, p. 134). The landscapes, the natural systems of great importance, and protected natural species are not located in the vicinity of Ecka industrial zone, but on the opposite bank of the river Begej there is a natural reservation - Carska Bara bird sanctuary. The proposed industrial zone does not pose a threat to this sanctuary, as, according to environmental regulation, all production units in the industrial zone need to go through an environment impact assessment procedure to obtain a license to operate (MSP-NE, 2008, p. 63.).

Finally, Michael Greenberg points out that Brownfield regeneration means the clearance of possibly contaminated land, which is useful for public health (Greenberg et al, 2001, p. 133). However, within the "Feasibility Study Zrenjanin" it is clearly stated that there is no risk to public health in construction or in the operational phase. In order to protect the future workers in the construction phase, it is essential to make available the personal protective equipment and to provide the training for workers' application of the same. The company that performs work on the site is responsible for this (MSP-NE, 2008, p. 120).

From the previous arguments it can be concluded that environmental sustainability and sustainable urban revitalization should become the basis of urban planning. This is the way that leads to achieving a balance between environment protection and regulation, social cohesion, and creating new value in the appropriate form of gover-

nance. Brownfield is the key and indispensable element of natural and environmental protection. Some projects and activities in the area of Greenfield investments may have the negative impact on environment, but it is important to note that these impacts can be mitigated by the set of measures proposed in the detailed plans. Implementation of these measures can be examined through the environmental management plans with the monitoring process (MSP-NE, 2008, pp. 28-29).

2.4. The social aspect of Greenfield investments

The last part of the research illustrates the impact of Brownfield and Greenfield sites on the social qualities of space. This is manifested through the range of phenomena, so the analysis is the most complex.

Some of the results of Brownfield regeneration are the elimination of urban poverty, more active employment in traditional industrial areas and preventing the further strides of social pathology. According to Michael Greenberg, the main advantage of Brownfield regeneration lies in the ability to create the sense of community, which is achieved by the promoting of the personal and family activities within the compact urban blocks (Greenberg et al, 2001, p. 137). The local revenues are increasing due to job creation and greater visit by the broader range of users. However, the economic standard betterment also causes the negative consequences. In fact, the part of the population that resided the Brownfield sites prior to their revitalization due to the low economic status is not able to respond to market demands in regard with the increased real estate taxes, increased rent, expensive utilities, and expensive services accompanying the increased standard. So the Brownfield regeneration is often followed with the process of gentrification, which results in the eviction of the original population. However, the Ecka industrial zone is uninhabited, so there is no possibility for the gentrification in this location. New economic development and new employment opportunities, with an increase in living standard arise as the positive effects on the Ecka Greenfield site (MSP-NE, 2008, p. 116).

However, the main reason for the unsuccessful realization of Brownfield regeneration in Serbia is

the lack of interest for creating and implementing the strategies of urban development among the local and state government. Similar to this, the strategies to support Greenfield development are not created at the state level, but the local governments use their own resources to promote development projects. The small number of local governments developed clear, simple and transparent systems to include investors in the development projects, and one of the most successful examples is the Ecka industrial zone. Greenfield investment are simpler for they require the smaller number of actors involved in the process. Since the is the unbuilt land outside the city centre, the ownership structure is completely transparent. In the case of Ecka, the land proposed for the industrial zone is classified as the public land, which implies the absence of private property. When the investment project for the Ecka industrial zone started, the possession structure of the site was in a full compliance with the principles of the former legislation, where the local government Zrenjanin was the only owner of the land.⁸ In this way, the number of actors involved in the process of land trade was reduced, and thereby the number of interested investors for Greenfield sites increased for they can become landowners, not just the users of the land (MSP-NW, 2008, p. 49). In addition, Greenfield has an advantage over Brownfield sites due to the possibility of increasing capacity, and, according to the results of the "Feasibility Study Zrenjanin", Ecka industrial zone is designed in a way that meets the additional population, which together enable the local economic development (MSP-NE, 2008, p. 107).

However, the analysis of conditions for Brownfield revitalization, as Borislav Stojkov highlights, provides the following results: the basic deficiency of these sites is the lack of adequate vertical coordination - at the state, region and municipality level as well as appropriate horizontal coordination - between the public institutions, private investors, local governments and citizens. The establishment of public-private partnerships and the increased activity of citizens is the solution of the problem in regard to Brownfield sites (Stojkov, 2007, p. 56.). Due to the large number of actors involved in the Brownfield regeneration process, and their vaguely defined correlations, the investment in Brownfield sites also causes the risk of an inaccurate date

for completion. Actually, the privatization law is not applied properly in Serbia. Its most important clause states that in the case of land contamination allocated to the regeneration, the involvement of special state agency responsible for providing guarantees to private investors is expected.

Greenfield investments are the product of cooperation between local authorities and investors, which is simpler in procedural terms. However, this is not a guarantee for the successful implementation of Greenfield projects - investment in Greenfield sites costs the local government a lot due to previous investments in infrastructure and the slow investment return (Stojkov, 2007, pp. 55). In the case of Ecka industrial zone, the local government has prepared a technical and financial project for the first phase of the realization. Since the cost of the infrastructure equipment is extremely expensive, it is clear that the municipality, which should provide the adequate site restoration, is often unable to do so. The preparatory projects for the Ecka industrial zone were implemented through the National Investment Plan. In many cases, Greenfield investments, however, need the financial support of the future investors, who invest not only in building, but also in the expensive preliminary work (MSP-NE, 2008, p. 43.)

3. Conclusion remarks

The arguments used in the research illustrates the most important aspects of a chosen problem. They are shown through its most characteristic features, both positive and negative. Research results do not represent completely affirmative acceptance of the stated arguments, and also not the preliminary rejection of the opposing views.

The arguments about economic, environmental and social benefits of Brownfield regeneration in the terms of sustainable development can be explained by the examples from the countries of Southeast Europe, where the social context is similar to the one in Serbia - there is the trend of Greenfield investment, but awareness about the necessity of investing in Brownfield sites gradually raises. According to Valerija Botric and Lorena Skuflic, the Brownfield sites are multiply cost-effective for several reasons, among which the most

important are the lower costs due to regeneration (in regard to the new construction), reduced operational costs and less investment in infrastructure (Botric & Skufflic, 2006). The cost reduction, caused by the replacing of the expensive energy resources, has not only positive economic features, but lessens fuel use and the intensification of urban public transport and pedestrian movement have a positive impact on the city ecosystem. The general urban betterment can be achieved by the appropriate treatment of the cultural heritage. This can be done by the realization of the vital cultural projects, which has primarily a positive influence on the demographic and social status - through raised accessibility and citizen motivation to reside and work in the urban core. On the other hand, the disorganisation of actors involved in the complex process of Brownfield regeneration prevents its rapid growth.

The analysis of the Ecka feasibility study provides the conclusion that all the negative effects of Greenfield investments in the case study are minimal. If the example is viewed from:

1. *The economic aspect*, the site Ecka is located at the crossroads of important communication flows. Highly effective urban transport infrastructure releases the city from the additional costs in terms of building the new communications. Also, by the associating with the Bagljas zone for the common and distinctive enterprise in the form of clusters, the creation of a dominant industrial and business centre is avoided and the balance of peripheral zone with the city centre is established. Besides Ecka direct impact on the nearest environment (increased employment, exports, taxes to be paid to the state), it indirectly influences the economic growth and the economic development of transition countries - the location is well connected with the centres of economic development in Belgrade, Novi Sad, in other cities of Banat, as well as Hungary and Romania, which is an advantage in the process of attracting investments;
2. *The environmental aspect*, Ecka industrial zone has no negative impact on the population due to the distance from the nearest residential zones, as well as the anticipated protective

greenery around its edges, but also along the main routes of communication on site. It was found that there are no risks for the public health in the construction phase, and prior to the operational phase, it is necessary that the future production facilities obtain the license in order to perform its function without environmental risk;

3. *The social aspect*, the site Ecka is uninhabited, so there is no basis for the emergence of gentrification in this location. New economic development and new employment opportunities, with an increase in living standard in the case of Ecka Greenfield site have only positive effects. Also, the land which is proposed for the industrial zone is classified as the public land, which implies the absence of private property, ie. resolved property correlations. The reduction in the number of actors involved in the process of land trade leads to raising the number of interested investors for Greenfield sites, which may become the landowners, not just users of land as before.

The paper reviews the most important effects of Brownfield and Greenfield investments, based on the fundamental principles of sustainable development with special reference to the example of the Ecka industrial zone. Since this overview is given in the form of the final conclusions resulting from the analysis of the aforementioned principles, some future research may address the profound analysis of only one of several offered aspects, with the aim of understanding the modern city needs and facilitating its further development.

(Endnotes)

1. Brownfield sites are defined as: "(...) areas and facilities in urbanized areas that have lost their original way of using or are hardly used. They often have, or are expected to have, environmental load and there are ruined manufacturing and other facilities. For many reasons, brownfield sites are the big part of the built areas in many cities. These sites have the negative impact on its wider environment, not only economically, but also in aesthetic, psychological and social terms" (Gligorijević et al., 2007, p. 12).

2. "Municipal Strategy for Sustainable Development" includes four basic elements of analysis: infrastructure, economy, environment and social development (MSP- NE, 2008, p. 38.).
3. Stable ground includes the geological structure which is composed of paleozoic and mesozoic rocks on the bottom, which are covered with anthropogenic materials on the surface (MSP- NE, 2008, p. 63.).
4. The costs for this include: checking the land capacity for building, the demolition of existing inadequate facilities at the site, the construction of major infrastructure lines and the installation of primary and secondary infrastructure (MSP- NE, 2008, p. 174).
5. Taking into account that this part of the paper emphasizes the economic effects, the wider context of Ecka site is considered. That is why the transport infrastructure is noted here, not in the first part which deals with the utility and energy infrastructure. Transport linkage is in regard with other parts of the city, not the equipment of the site in terms of mobility.
6. As these are the global environmental parameters that are relevant to any area of the world, it is clear that the results can be successfully compared with the current situation in our environment.
7. According to the Swiss formula for the classification of brownfield sites, which reads: value of recycled land - (preparation costs + transformation costs) > 0,
Brownfield sites are classified into three groups:
 - 1 - A brownfield category (sites in the central parts of the city with the domination of the central activities);
 - 2 - B brownfield category (sites in the former, abandoned industrial zones);
 - 3 - C brownfield category (sites outside the urban and rural areas) (Stojkov, 2007, p. 55).
8. Before the new Law on Planning and Construction (August, 31, 2009) was adopted, the local government had the status of landuser, while the status of land ownership belonged to Republic of Serbia.

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