
Brownfield Redevelopment in Turkey as a Tool for Sustainable Urbanization

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Abstract

Brownfield redevelopment is becoming a major planning issue with its environmental, social, economic, and spatial dimensions all around the world. As the attempts to manage the risks and costs associated with brownfields improve and the perception and awareness through the society increases, more stakeholders are put effort to achieve a broader range of environmental, social, and economic objectives under the concept of sustainable development. Since the mid-1980s, sustainable development has become widely discussed approach for integrating environmental needs with economic and social ones in human development. In this context, brownfields left over from industrialization provide an opportunity to address sustainable developments through urban planning approaches. As a result of the emergence of the sustainable development and brownfield regeneration agendas, there has been increased debate over the concept of “sustainable brownfield regeneration.” Turkey has relatively a short history of industrialization; thus, brownfields are a new phenomenon which started to occur in the middle of 1980s. The brownfield policies in Turkey, generally discussed in context with urbanization and heritage preservation. However, their appearance and redevelopment have much related with the privatization and neoliberal policies which have had great effects in the country economic and social structure. Besides, EU candidacy have stimulated the compliance of Turkish legislation to the European standards since the beginning of last decade. Environmental and historical preservation and administrative decentralization constitute the significant subjects related to brownfields redevelopment. Cities in Turkey struggle with many economic, social, environmental, and politic problems. At this point, brownfields represent opportunities in order to obtain sustainability and increase the living standards especially in urban areas. This work aims to put forward the brownfield related policies in Turkey and to determine the main obstacles in brownfields redevelopment, the essential policies and strategies which can be transferred from Western countries experience and the essential steps which must be taken at the early stages of deindustrialization and decentralization for Turkey in context with sustainable urbanization.

Keywords: Deindustrialization, brownfields redevelopment, sustainable development, privatization, environmental policies

1. Introduction

In recent years, there has been a strong emphasis on brownfield redevelopment as a type of urban regeneration with a strong link to sustainable development in developed countries. As Dixon [1] indicates, such an approach highlights the importance of reusing and recycling brownfield sites in order to improve the urban environments and to release development pressures.

However, brownfields are generally not economically competitive when compared with greenfields without any public intervention. There are economic, social, and environmental barriers in returning the brownfields to beneficial uses. In spite of all problems, these sites may include, they are also regarded as an opportunity in providing sustainable urban development and to bring extra values into poor-quality lands and declined urban parts.

Sustainability has become a major issue in development strategies since the end of 1980s. As it is well known, in Brutland Report sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [2]. At this point, it is necessary to think about whether all the brownfields regeneration projects really obtain sustainable development in the cities. What are the driving forces, policies, and handicaps in returning these areas into beneficial uses? Such a thought impulse us to ask what are the essential strategies in sustainable brownfield regeneration? Before determining the sustainable brownfield regeneration, it may be useful to look at the definitions about brownfields in all around the world.

2. Brownfield definitions

In the beginning of brownfield-related researches, one important problem is the lack of a common definition accepted by all countries in the world. The term “brownfield site” has different meanings in different countries. According to USEPA's renewed official definition brownfield site is “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant”.¹ Unlike the EPA's definition, brownfields are more referred to “previously developed lands” than “contaminated sites” in UK and are accepted as all abounded, idled,

¹ Small Business Liability Relief and Brownfields Revitalization Act, 2002.

or underused properties with fixed infrastructure and developed surface on site regardless of whether contamination is present or not [3]. In fact, most of the European countries do not determine the brownfields directly related with the contamination on the site [4]. But this does not mean that contamination is neglected in the brownfield redevelopment. Whatever the definition, brownfields can be characterized with some common features such as economic failure, difficulties in attracting new investors, high unemployment rate, negative effects on urban life, social conflicts, consumption of greenfields [5].

Unfortunately, lack of commitment on the term of brownfield makes difficult to determine the amount and dimension of the problem and also to designate common strategies for the sustainable development.

In spite of these complexities, the organizations such as RESCUE (Regeneration of European Sites in Cities and Urban Environments) try to define a common strategy and recommendations for EU countries through conducted analysis among the members. The main objective of RESCUE is to make brownfield redevelopment a key part of European Union's strategy on sustainable urban development and to show the EU what tools are necessary to maintain sustainability [6].

Another brownfield organization, funded by the Environment and Climate Programme of European Commission, CLARINET's (Contaminated Land Rehabilitation Network for Environmental Technologies) primary objectives are to develop technical recommendations for sound decision-making on the rehabilitation of contaminated sites in Europe and to identify research and development needs, in particular in relation to the EC Fifth Framework Programme [16]. CLARINET developed the concept of Risk Based Land Management as a step forward toward an integration of sustainable soil quality, the protection of water, and land-use management in environmental policy. In a report of CLARINET on brownfields, published in 2002, it is indicated that brownfields are spatial planning and ecological problem in relation to human health and it is proposed that successful brownfield redevelopment needs to have an integrated approach that addresses environmental and spatial planning problems simultaneously [6].

From this point of view, it must be noted that the main objective of brownfield redevelopment is not reuse or reintegration of land. It aims to supply a combination of social, environmental, and economic benefits through sustainable development perspective [7].

As a result of the emergence of the sustainable development and brownfield regeneration agendas, there has been increased debate over the concept of "sustainable brownfield regeneration". In this context, Dixon [1] tries to determine a number of sustainable brownfield development objectives to develop actions at the site level. These are minimizing the use of resources, minimizing pollution, protecting biodiversity and the natural environment, protecting the industrial heritage, and protecting the cultural environment.

It is possible to designate additional objectives related with the countries' and cities' visions and economic and environmental priorities such as, job creation, quality of life improvement, reducing urban sprawl.

3. Brownfield redevelopment in Turkey

The term “brownfield” or, as in the Turkish case, “former industrial area” has been recently introduced to Turkish agenda and is often related to the process of industrial decentralization and privatization of government-owned firms through state's liberalization policies. On the other hand, as the result of European Union membership attempts, many manufacturing industries had to stop their operations due to the impact of establishing the customs union between Turkey and the EU after 1995.

As a new phenomenon, brownfields redevelopment has been subject to academic research in Turkey since the beginning of the twenty-first century. The recent research about brownfields redevelopment in the country generally handled the issue from historical heritage preservation perspective with very limited and partial assessments.

Most of these scholarly studies deal with the preservation of industrial plants and buildings on the brownfields as important indicators of the former industrial identity of the cities and approach the issue as a design and conservation problem [8–22]. Almost all of these papers are concerned with brownfield sites at metropolitan areas such as Istanbul, Ankara, Bursa, Eskisehir, Izmit. As a general concluding remark, the political and legal uncertainties are emphasized in these writings. Koksall [19] also focuses on the insufficiency of brownfield-related inventory and highlights the necessity of analysis of the documentation for the old industrial plants as a form of historical archaeology. Asiliskender [9] argues in his Ph.D. dissertation the importance of the protection of these lands as symbols of Turkish modernity. Some of this research evaluates the brownfield redevelopment issue through urban regeneration concepts and policies and tries to put forward some proposals for alternative uses in order to connect these sites with other urban functions [23, 17, 24, 16, 18, 25, 15, 26, 27].

The other remarkable issue in these studies is the lack of interest in contamination- and environmental-related issues. Contamination is mentioned as an obstacle only in the paper of Turer Baskaya [28] and with a very limited focus. Another significant study which uses the term “brownfield” is the Ergen's Ph.D. Dissertation. Ergen [29] analyses the issue in terms of sustainable development with a focus on environmental impacts of abandoned lands from a perspective of landscape architecture in a shrinking city of Turkey.

There is no doubt that Turkish urban development and related issues are very different from Western countries. But in globalized world, there is a need to understand the specific and worldwide problems and to develop the most proper solutions to eliminate them.

Turkey, as a centralized country which is shifting its policies toward administrative decentralization and EU membership, has many difficulties in sustainable brownfield redevelopment, as in other regeneration projects. The complexity of brownfield redevelopment requires substantial efforts in the planning process to investigate contamination on the sites, to estimate market demands and to communicate with stakeholders. However, in Turkey, this complicated process has been challenged by rapid urbanization for decades, and the roots and policies for brownfields have had a process distinct from United States and other Western countries experiences [30]. Although there are many similarities in terms of globalization, technological

changes and the liberal economic policies following after the 1980s, the historical perspective and driving forces which have caused the brownfields are different.

3.1. Policies, strategies, driving forces

Brownfield-related policies in Turkey represent the impacts of privatization and neoliberal policies after 1980s. In addition to the central role of the government, the strategies and priorities of local governments through their ideologies reshaped the cities, especially İstanbul. There is no doubt that the accomplishment of a sustainable brownfield redevelopment is directly related with the economic/social structure and environmental priorities of the countries. Turkey, as a developing country has been in a dilemma between economic development and environmental protection. The distinctions in industrialization process, social, economic, and politic structure necessitates to evaluate the sustainable brownfield redevelopment issue in its own dynamics.

3.1.1. Environmental policies

When compared with United States and Europe cases, the environmental dimension of brownfield redevelopment is much neglected in Turkey. Turkey started to discuss the environmental issues by the early years of 1970s. Over the last 45 years, it can be said that Turkey has made great progress in creating mechanisms to address its environmental problems: The 1982 Constitution recognizes the right of citizens to live in a healthy and balanced environment; an Environment Act was passed in 1983; the Ministry of Environment was created in 1991; public awareness and demand for a clean environment are growing; and active non-governmental environmental organizations are emerging [31]. Furthermore, in another Article of the constitution, environmental rights are not only defined as part of states purview, but also a duty for every citizen. Despite these positive developments, environmental issues have not been adequately incorporated into economic and social decisions [32].

The Environmental Law which came into force in 1983 endorses the “polluter-pays principle” which is the main principle of brownfield related legislation in USA and the environmental regulation in EU and handles environmental issues on a very broad scope [33]. There is not a specific regulation about brownfields even though the existence of many related laws and regulations which govern the environment and land use in Turkey.

In Turkish environmental legislation, Regulation for the Control of Soil Contamination and for the Particularly Contaminated Lands (RCSCPCL), taken effect in 2010, is very important in terms of brownfields issues. The aim of the regulation was to prevent the contamination of land, to find out the potential and probable contaminated lands and sectors, and to determine the clean-up and monitoring principles with respect to sustainable development purposes.

According to the RCSCPCL, the lands and plants which are contaminated as a result of disaster or accident, and which are determined as hazardous for the environment after the controls are recorded in the Hazardous Land List. The remediation of these sites requires the approval of “site analysis reports,” “evaluation of the situation of land,” and “risk reports and the clean-up activities reports” by the Province Directorate of Environment and Urbanization.

Moreover, in 1993, Environmental Impact Assessment (EIA) was enacted according to the United States and European procedures, and it was improved in 1999 according to European EIA directive. Even though the recent laws and regulations have raised the public awareness in environmental issues, there is still a big gap in the Turkish legislation in terms of liability and financial issues. However, it is evident that the further developments and regulations should be established the environmental roots of the country especially in terms of sustainable development.

3.1.2. *EU candidacy*

EU accession and candidacy can be considered as the most important driving force for the improvement of Turkish environment legislation and public awareness in sustainable brownfield redevelopments. Since the environment is one of the priority areas for Turkey's membership preparations, several new regulations put into force in the last two decades. Since EC-Turkey Association Council implementing the final phase of the Customs Union, there have been continuous efforts on the part of Turkey to harmonize its legislation with the EU *acquis communautaire* [34]. The candidacy indicates the priority areas for Turkey, and environment is one of them (in addition to other politic and administrative areas).

According to Budak [35], Turkey had at the turn of the century incorporated the environmental concerns and policies of the EU into its legal structure to a great extend as a non-member state. And, according to the findings of a research conducted in 2001, Turkey had made a great deal of progress in regard to the approximation of environmental *acquis* in some areas such as textile and chemicals [36].

However, compliance to EU rules sometimes can be costly for the national economy, and therefore, some challenges can be appeared in the society. EU environmental rules require the recognition of shared responsibilities. Actually, beyond the EU standards and profit maximization concerns, private actors must develop a new sense of responsibility for environment and sustainable urbanization [37].

EU memberships in Turkey still a question of socio-economic development and a slogan for modernization. In a broader sense, EU affects both legal and political structures and the public opinion. It seems that in short term, the impact of environmental policy on sustainable development-related issues such as environment, urbanization, growth, regeneration are likely to become more popular subjects in the public opinion and on the agenda of policy makers in Turkey. It can be said that, in spite of the improvements in environmental policy with the impulse of EU candidacy, further attempts are required in order to reach the developed counties standards.

3.1.3. *Privatization policies*

One of the main differences for the brownfields-related issues between Turkey and Western countries is coming from the liberal policies of 1980s which is very effective and cause huge changes in Turkish government system. Although the brownfields are appeared as the results of urban sprawl and deindustrialization in developed countries, in Turkey most of the

brownfields areas have become sites which need urgent solutions after the implementation of privatization policies.

As previously mentioned, privatization and governmental decentralization have been the main reasons for the appearance of brownfields in most of Turkish cities. Due to the fact that central policies have shifted to more decentralized structure in Turkey, many industrial plants which were established and operated by central government were privatized since the mid of 1980s.

In Turkey, Public Enterprises (PEs) had a significant role in the economic development of the country from the beginning of Republican Period. PEs emerged during the 1930s not for ideological but pragmatic reasons, mainly owing the lack of private capital accumulation and initiative to give the first impetus to development [38]. Most of them are large-scale investments and operations and used by the governments in order to create the necessary industrial infrastructure, to prevent unemployment and to reduce regional inequalities between the regions [38]. However, after starting the implementation of privatization policies, central government did not put any effort to revitalize or to enhance the technological capacity of these industrial enterprises. As a result, most of them closed and the sites remained idle.

In fact, today, the privatization practices are seen in many countries whose economies are called liberal, socialist, or mixed [38]. According to UNESCAP's (United Nations Economic and Social Commission for Asia and Pacific) [41] point of view *"the private sector is a key environmental actor, as its enterprises generally perform better than parastatals (government-owned companies), treating almost twice as much of their wastewater and spending less than half as much for final disposal."* Actually, in Turkish practice, it cannot be said that private enterprises are more environment-friendly than the government-owned ones.

The transfer of industrial areas by the impulse of privatization policies and globalization has caused vital changes especially in metropolitan cities in Turkey. Istanbul, the financial and the cultural capital of Turkey, has taken attention of the global investors with its dynamics and potentials. Consequently, state-owned industrial areas located in and around the city have become subject to privatization one by one. In this process, central government and local government have stimulated the transfer of the industrial areas by promoting them and by constituting action plans.

As a result of these attempts, many of the Turkish cities, mostly the metropolitan cities, have had to struggle with not only a physical segregations, but also economic, social and cultural changes occurred in a very rapid way without considering the possible outcomes/impacts of transformations.

3.1.4. Rapid urbanization

In Turkey, migration from rural to urban areas since 1950s has had a significant effect in the decentralization of industries and urban sprawl in metropolitan cities. At the early stages of this process, squatter houses (in Turkish literature *"gecekondus"*) appeared in Turkish metropolitan cities as the form of unplanned and uncontrolled urban development on the public lands around the industrial sites. These areas formed the settlements of workers which the

industries require. By 1980, with the impact of technological improvements, liberal policies/privatization, and globalization most of the industries moved to the organized industrial areas with the support of local and central governments. Many of the industries had preferred to abandon their properties in the inner cities due to the high land values and insufficient lands to expand. The decentralization of industries also gave way to the decentralization of *gecekondu*s through the periphery of cities. As a result of this urbanization process, the former industrial areas in the city centers remained vacant with many contamination and other environmental problems.

In Turkish case, the urban regeneration-related issues have taken place by Habitat II meeting held in Istanbul in 1996 [15]. After this meeting, urban regeneration has become a new local policy in restructuring the cities through national plans and brownfields and *gecekondu*s have seen as a tool for promoting cities in the global markets. However, these regeneration projects have put in force without comprehensive social, physical, and environmental sensitivities, generally far from a sustainable approach.

In recent years, most of the local authorities have renewed the upscale and detailed plans in order to galvanize the city's developments with new strategies and visions especially in metropolitan areas. Urban regeneration has been identified as the significant tool for achieving in the redevelopment of cities through global and local demands. In this process, brownfields have taken the attraction of developers and global investors with their locations and sizes. However, local authorities have tended to regard urban regeneration mostly as a project-based developments rather than a holistic restructuring process at the urban scale [39], and as a result, former spaces of industrial production sites can turned into luxurious residences, gentrified neighborhoods, office towers, shopping complexes, and the like [40]. Although these transformations negatively criticized by academicians and experts on the local agenda, local governors strongly support them in order to gain revenues and to integrate global cities network.

This situation is defined as “market-oriented transformation through governmental assistance” in many academic writings and reports [15, 39, 41–43].

3.1.5. Preservation policies

The concept of brownfield regeneration was taken place at the Turkish national agenda with the acceptance of the ICOMOS Montreal Action Plan by the Turkish National Committee of ICOMOS in 2001, which allowed industrial buildings to be conserved as part of Turkey's twentieth century cultural and architectural heritage [15]. Since the midst of 1980s, the potential of old industrial areas as a cultural heritage have recognized, and some projects were developed through the international preservation policies, especially in Istanbul. However, the sustainability issue neglected in most of those implementations. This is due in part to a general lack of awareness and an absence of nationwide debate about sustainable development. Furthermore, there was no participatory element in the decision-making, planning, and implementation of these brownfield regeneration projects [15].

Another international organization, DOCOMOMO, played a crucial role in fostering interest in conservation of built heritage which reflects the spirit of the Maschine Age in the world. The fact that many of the industrial modern buildings not being considered as the elements of heritage caused the demolishing or changing their original structure. In Turkey, DOCOMOMO's activities not only increase the attention to the industrial buildings as masterpieces, but also accelerate the institutional and academic interest on brownfield sites since 2002.

3.2. Barriers and assets in sustainable brownfields redevelopments in Turkey

In Turkey, the central and local governments' policies do not include the brownfield redevelopment related issues and on the other hand, the policies about sustainability devoid of the practice. Therefore, several obstacles occur in sustainable brownfield redevelopment, which are delaying the process.

The lack of liability and contamination issues in the environmental and land-use policies creates the major handicaps in the brownfield redevelopment process in Turkey. Despite some positive attempts for the integration of legislation to EU standards, there is still uncertainty related with liability and interventions to the contaminated lands.

The lack of nation-wide and city-wide database system is another vital obstacle in brownfield redevelopment in the country. It is nearly impossible for a researcher to determine the amount of brownfields and the level of their importance in the urban development. However, as a country whose metropolitan cities struggle with rapid urbanization and whose environmental resources are under the risk of deterioration, it is essential for Turkey to know the capacity of brownfields and to estimate the possible settlements for increasing population.

Due to the fact that most of the state-owned industrial sites are located at the centers of the cities on very strategic and valuable lands, their transformation and purchasing have been subject to many political and public debates because of the lack of transparency in the privatization process. These debates broadly interrupt the regeneration process and sometimes make the land remain idle for years.

Another essential issue in brownfields redevelopment is the effective involvement of different stakeholders in the process of redevelopment. Due to the lack of legal arrangements and policies for the participation of the citizens, environmental organizations, real estate developers, non-governmental organizations (NGOs), and local and central government agencies, the redevelopments of the brownfields, especially the ones located on valuable properties in the inner parts of cities, have been subject to speculations in the public agenda.

Despite the obstacles in brownfield redevelopment and preservation of historical industrial buildings, some good practices in metropolitan cities can provide some benefits in terms of sustainable development. Especially, in terms of preservation of the sites as the symbols of the cities' previous identity, there is an increasing awareness at local and central levels. Although there is still need a comprehensive approach in handling the problem together with its social, economic, and environmental dimensions, these attempts can be considered as the signs of more sustainable solutions.

The SWOT analysis in **Table 1** summarizes the positive and negative aspects of sustainable brownfield redevelopment issue in Turkey with a strategic point of view.

	Strengths	Weaknesses	Opportunities	Threats
Environmental/physical	-Existence of infrastructure -Accessibility -Historical heritage	-Lack of public awareness -Lack of legal arrangements related with environmental contamination -Lack of standards about remediation issues -Uncertainty in responsibilities	-Increasing public awareness in environmental related issues all around the world -Existence inside the city centres	-Urban sprawl -Greenfields -Lack of a definite environmental policy -Privatization policies -Lack of specific legal arrangements related with brownfields
Economic	-Valuable properties in the inner cities	-Handicaps in the transformation of state-owned properties into private properties -Financial risks due to contamination	-High market demand -High land prices	-Speculative implementations -Lack of administrative investments
Social		-Insufficient awareness in historical heritage preservation -Weak environmental groups		-Lack/insufficiency of public participation -Public resistance -Lack of collaboration between the stakeholders

Table 1. SWOT analysis for sustainable brownfield redevelopment in Turkey.

4. Recommendations for Turkey

In Turkey, brownfield redevelopment issue needs to be handled in a comprehensive manner beginning from policy formulation to determining design criteria. Cities in Turkey must struggle with many economic, social, environmental, and politic problems. At this point, brownfields represent opportunities in order to obtain sustainability and increase the living standards especially in urban areas.

One study of several EPA Brownfield Pilot projects found that for the sustainable brownfield redevelopment, the most common scenario involves a local government entity taking ownership of the site, characterizing environmental contamination, and then marketing the property to private sector [44]. This strategy is also can be very useful for Turkey. The Pittsburgh, USA experiences represent good practices to the essential roles of local authorities in brownfield redevelopments. In Pittsburgh case, URA did not only take place as a developer but also as facilitator that eliminate financial, social, and environmental obstacles [45]. The local governments can undertake the URA's role in small and medium sized cities in Turkey. On the other hand, a new body as a coordinator and technical assistant can be established in metropolitan cities in order to prevent speculative property transformations and to provide collaboration between central and local entities in financial and legal issues. Such an institution can also

stimulate the public participation by organizing training programs. The structure of the institution should be generated with the interdisciplinary approach in a way to include environmental experts, urban planners, urban designers, economists, sociologists, architects, and lawyers.

In Turkey, the responsibilities for the waste managements are distributed between several institutions and organizations. The new authority can also coordinate and undertake some of their responsibilities in technical, financial, and monitoring issues.

As mentioned above, lack of transparency has been one of the major barriers in the redevelopment of brownfields. In Turkey, corruption in municipalities especially in urban development-related issues has been on the public agenda for decades [46]. Plan modifications and implementations generally have been subject to court cases. The transformations in state-owned lands, therefore, must be realized in transparency with public participation in order to eliminate speculations.

A big amount of brownfields in Turkey are originated from formerly state-owned firms. In order to turn those properties into marketable products, some essential changes should be done in the scope of urban development policies. At the same time, local and central authorities could prepare concrete measures to benefit brownfield redevelopment such as tax reduction and promotion of brownfields as equally interesting entities as greenfields.

Environmental taxes are widely used policy tool in many industrialized nations. Turkey also employs tax policy for environmental protection purposes. However, environment-specific taxes have been introduced primarily for revenue raising purposes. Since additional revenues collected through environmental taxes have not been allocated for environmentally friendly investments or services, their impact on the environment remains limited to gains from reduced consumption [37]. The legal arrangements should be done to provide the use of environmental taxes for environmental issues.

As brownfields are seen in the context of privatization, the legal and institutional framework should also be rearranged towards dealing with the remaining state property and enterprises in which the government still has responsibility. The remaining state-owned lands in metropolitan areas and small sized cities must be seen as opportunities for eliminating the environmental, economic, and social problems with a sustainable approach.

Another essential issue in Turkish case is the necessity of available data for the potential brownfields at national and local level. The absence of such inventories makes it impossible to estimate the dimension of brownfield problems and their possible socioeconomic costs. In United States and many of the Western countries governors try to determine the amount of brownfields. The data provide the vital knowledge for federal government in distribution of the public funds between the local authorities. As a country which struggle with unemployment and lack of financial sources, it is necessary to take the advantages of international funds for the projects where market-demand is low. Especially, the brownfields in the small and medium sized cities EU funds address opportunities for obtaining sustainable urban development and creating jobs on the brownfield areas. EU generally supports the well-defined and

well-organized projects which aims environmental protection and eliminated air, soil, and water pollutions [47].

Among all, ensuring the community involvement is one of the cornerstones of brownfield redevelopments [48–51]. The impacts of brownfields can extend beyond the boundaries of the property to affect the neighborhoods and environment. Safety problems, environmental, and public health threats are some of their negative impacts on the surrounding communities. On the other side, their redevelopment can provide some economic and spatial opportunities. The increased efficiency of community-based organizations and community development corporations has triggered the governments to search for the ways to stimulate their participation [52]. Most of the governments recognized the fact that without their participation, it is nearly impossible to achieve a successful project in a reasonable time. However, in Turkey, most of the urban regeneration projects were realized without community participation. Therefore, there are still some challenges in the society against the regeneration projects.

All in all, the required attempts in order to achieve sustainable regeneration/redevelopment of brownfields at the national and local level in Turkey can be summarized as in the **Table 2**.

National level	Local level
Setting essential legal regulations	Designating brownfield sites (constituting an extended programmatic definition)
Setting a conceptual definition	Setting critical decisions about characteristics of the brownfield sites
Developing national, regional and city data bases of sites	Determining the goals and objectives of sustainable brownfield redevelopment
Determining national and regional development strategies	Determining the vision of cities through sustainability
Allocating national funds	Allocating local funds
Establishing transparency	Establishing transparency
Preparing national and regional development plans	Preparing master plans, detailed plans through sustainable development strategies
	Determining the possible stakeholders and their roles

Table 2. Required attempts for sustainable brownfield redevelopment in Turkey.

5. Conclusion

There has been an increase in the number of brownfields especially at the metropolitan areas as a result of the rise in population in Turkey. Turkey has been faced with migration from rural to urban areas since 1950s. In this respect, brownfield sites provide an alternative land-use supply, and thus a more sustainable way to preserve land resources. However, the most important issue of brownfield redevelopment, the contamination, has not been fully understood nor well recognized in the Turkish brownfield policies and strategies. In Turkey, there has been a tendency for planners and architects to handle the brownfields as a symbol of

industrial heritage and as industrial archaeology areas, and therefore, the policies and implementations have been developed through the concept of preservation and urban regeneration rather than environmental clean-up.

It may be interesting to indicate that brownfields are formed not only as a result of rapid/uncontrolled urbanization but also as a result of planning decisions in Turkey. Recent researches about the industrial movements in Turkish metropolitan cities [23, 24] have showed that most of the industrial firms changed their locations through master plan decisions prepared by local and central governments. Another significant factor in the formation of brownfields is the privatization of state-owned industries as a result of liberalization policies after 1980s. Most of the industrial areas and plants which were founded at the beginning of the Republican period have been subject to put up for sale through market demands. Establishing at the inner parts of the cities at the most valuable lands have not only increased the market demand but also the speculative sales due to the lack of transparency and lack of definite public policies for the redevelopment of these lands. Under these circumstances, brownfield redevelopments are often realized in a project-oriented manner, and this approach fails to meet the requirements of sustainable brownfield redevelopments.

The obstacles in brownfield redevelopment in Turkey broadly relate with indefinite policies at the national and local level, lack of specific brownfield-related regulations, lack of database and definition, insufficiency of practical knowledge and public participation, and lack of transparency in property transformations. There is no doubt that the environmental legislation in Turkey should require additional regulations concerned with contamination, remediation, liability, and public participation issues. The Western countries' experiences demonstrate that without a specific legal arrangement at the federal and state level, it is not possible to develop appropriate solutions for the sustainable redevelopment of brownfields [30, 45]. In Turkey, the responsibilities of central and local governments should be identified with the emphasis of the involvement of all the stakeholders.

Turkey, as a late industrialized country, can contribute the sustainable development strategies in brownfield redevelopments. Turkey has been at the point of development and environment dilemma for decades which constitute a big barrier in sustainability and sustainable urban regeneration issues. In the economically depressed areas, it is very difficult for the planners and politicians to support the policies considering environmental, recreational, historic preservation, and design principles and related solutions.

In Turkey, the planners and environmentalists have competed with political interest (often unsuccessfully) to protect the historical and environmental sources in the cities. On the other hand, the capitalism also reshaped the landscape with the emphasis of productivity more strongly, rather than sustainability and urban efficiency concerns.

Consequently, beginning with recognized gaps in brownfield-related literature and practice, this study has taken the picture of the sustainable brownfield redevelopment issues in Turkey and tried to develop some recommendations for future attempts through developed countries' perspectives.

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