



## An essay on accessing the brownfields redevelopment roadmap appropriate with Iran's condition

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Received: June 2014, Accepted: April 2015

### Abstract

The concept of redevelopment is accompanied by actions and forecasts to improve the quality of the physical-spatial environment in the cities, that is by the emergence of new facilities and conditions, improving the spatial environment is achieved. This requirement occurs when the coherence, coordination and the performance of the urban area is diminishing and is not responsive to the requirements of that area. The brownfields are amongst the inefficient urban areas and require redevelopment, which mostly include Deteriorated buildings accompanied by environmental contamination. The main issue of the present study is the lack of a compiled and appropriate roadmap to redeveloping the brownfields in Iran. Accordingly this article is seeking to introduce and present the defining indicators of brownfields, adapt these indicators to Iran's condition and achieve the redevelopment roadmap of these lands in Iran. In this regard, the codification of this article has been done by the descriptive-analytical method. Results of the study show that the main problem of Iran's planning system is the lack of a regulatory and legal description of brownfields on one hand, and absence of a compiled roadmap to lead urban development into the zone and use the capable potentials and opportunities for redevelopment.

**Keywords:** Redevelopment, Abandoned Lands, Brownfields, Roadmap, Iran.

### 1. Introduction

One the most important challenges of planning the land use in cities is the shortage of land to develop and providing the new requirements of the urban areas. In areas like this, one can't easily attempt to change the performance and use of the land [1]. In this regard, the new requirements of the society and the deficiencies of the available areas, makes the need for the new developments in the cities inevitable. Therefore, we should look for a replacement to the vacant lands, in order to develop them in the urban textures. Infill development is an approach in response to this requirement and has suggested different methods. One of these methods is the city redevelopment which is applied to different areas like the abandoned and inefficient lands, the inner regions and the traditional centers of the cities and seeks to reuse the previously developed and currently inefficient lands. This method is based on this principle that in Scarcity of space we should look for the areas that don't have adequate efficiency and use them to develop and provide the new needs, so that the current active areas are not damaged. One of these areas, are the abandoned industrial lands or the brownfields.

Brownfields are in fact pieces of land with redevelopment capability, which are abandoned because of their previous applications – such as industrial or mineral- and incurred different contaminations of soil and water and environmental degradation and usually contain old and rusty housing. This category of lands is considered one of the most important urban development potentials around the world, due to their location and being large-scale, which requires more consideration and urban planning interventions.

In Iran, despite the shortage of land and uncontrolled horizontal expansion of the cities, the existence of ruined-abandoned Industrial textures, warehouses and business areas with low efficiency, large-scale wastelands and areas with environmental pollution in the cities especially metropolises, no action has been done in terms of regulatory and legal considerations and providing instructions for planning and design. So, the brownfields are important as a significant component in the urban infill development paradigm and should be identified and recognized.

### 2. Methodology

The main point of the present study is to access indicators and criteria defining brownfields and how to redevelop them appropriate in cooperation with the situation in Iran. In this study using the descriptive-

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analytical method, first by exploring the definitions proposed in different countries around the world and their operational solutions about the redevelopment of these lands, we'll reach a set of indicators, and then given the condition of metropolises in Iran, a suitable roadmap will be suggested for the redevelopment of the brownfields.

In order to develop an effective Brownfield's redevelopment roadmap for Iran, the first step was to conduct a thorough review of background information. This included a review of:

I) Study the different definitions of brownfields and redevelopment

II) Study one of the most useful brownfield redevelopment roadmap in developed country.

This review of background information helped to establish the parameters of possible process of brownfield redevelopment.

The second step was to conduct a thorough review of the structure of brownfields in Iran and then find the main factors and indicators in defining them. And finally the interview responses were also utilized to develop custom brownfields redevelopment roadmap and municipal actions designed to overcome the impediments to brownfield redevelopment in Iran.

### 3. Materials and Methods

#### 3.1. Redevelopment

Redevelopment is one the most effective economic development tools, which creates a new life in areas that are affected by some in appropriate and negative physical, economical and natural conditions and prevents the city from investment by special measures, and is in fact a mechanism that can reduce the course of decline and decay of the area and stimulate the Revitalization process.

Redevelopment indicates a way for cities and neighborhoods to employ their money in order to eliminate the decline and decay and improve the poor situation of streets, public facilities, Residential spaces and the Infrastructures. Also the societies with limited financial sources can use the redevelopment plan as an effective tool to start the public improvement, properties revival and development and special investment that can't be done by other public tools [2].

Urban redevelopment can be provided and performed as a distinct project or in combination with other intervention approaches in urban cortexes, to support a comprehensive planning. Business corridors Modernization, Reconstruction of old houses, development of the inner city lands, reusing the industrial areas by changing the land use and sometimes displacement with the new industries are the approaches along with this program [3]. This will provide incentives to engage in development and construction in a society which its development in the future will bring about many benefits.

the definition of urban redevelopment quoted from American Planning association states that: "redevelopment includes development and improvement of an area which has developed in the past times, but currently suffers from actual

or perceptual physical defects, such as Inefficient Spaces, or the environment pollution or was created and developed in the past for a special purpose that over time caused problems and pollution in that area or because of the change in social conditions, such as change of commerce or the markets available in the city, may go through economic depression and eventually Deterioration and exhaustion [4].

#### 3.2. Lands with redevelopment potential

Lands with redevelopment potential are applied to developed areas or vacant lands that are placed within the city limits and should be developed based on the redevelopment plan. In general, lands with redevelopment potential have the following features: existence of abandoned buildings, nonstandard houses, empty and ruined pieces of land, also have different social, economical, physical and environmental issues that limit the growth. For example [5]:

- Sociologically: existence of nonstandard houses, high unemployment rate, lack of social and collective identity and etc.
- Economically: Low-value asserts and properties, lack of employment, non standard development of lands, undeveloped lands, and incompatible uses.
- Physically: improper and confusing streets, water and wastewater utilities without the proper and adequate Performance, shortage and sometimes absence of street illumination.
- Environmentally: shortage of open and attracting areas, poor maintenance of buildings, disorder of required signs and guides in an urban area, anarchy and chaos and lack of boundaries for residents' interests and etc.

From the American Planning Association perspective, redevelopment of urban centers, urban areas and other areas that benefit from facilities, and are supported by utilities, is an essential indicator. According to the definition of this association, each of the various areas that need redevelopments, have different features and require special planning approaches that are divided into the three following categories:

- Business areas stricken with recession in retail, administrative and residential actions associated with that.
- Residential areas which have a poor state of Residential Units and began Exhaustion.
- Industrial areas in which the industrial equipments and facilities are left abandoned and useless and their site is environmentally pollutant and should be organized in the reuse program [6].

According to the features described, lands with redevelopment potential are the whole or part of Metropolitan area that their Biological system has faced with disruption and inefficiency, in terms of structure and also their critical components performance. In other words, areas of the city which are left vacant and unused or encountered urban decline and spatial concentration of economic, social, Physical, environmental and intellectual problems. All of these types of lands are considered the potential areas for inner development that should be retrieved through appropriate plans.

**Table 1** Features of the lands with redevelopment potential (Conclusion and summary: Authors)

Lands with redevelopment potential		
Introduction	General Characteristics	Special Characteristics
Deteriorated area	Dysfunctional areas that have residents but residence in these places is inefficient	<ul style="list-style-type: none"><li>- Residential areas where the residential units have a poor state and experience exhaustion</li><li>- Areas that are vulnerable because of physical exhaustion, Lack of adequate roadway access, utilities, urban services and infrastructure and have low physical, environmental and economical values.</li><li>- These textures don't have the possibility of spontaneous Renovation due to the Poverty of their inhabitants and owners and need intervention and redevelopment [7].</li><li>- Textures that mainly hold the urban poor and immigrants and came to existence without authorization and illegally inside or outside the Metropolitan area.</li></ul>
Squatter		<ul style="list-style-type: none"><li>- They mostly don't have a property deed</li><li>- In terms of physical characteristics and Entitlement to services and urban infrastructure are severely deficient, the same as old textures [8].</li><li>- Intervention and redevelopment in this area will be the organizing and empowerment type.</li></ul>
Arid Lands	Arid or vacant lands are the lands that don't have a special urban use.	<ul style="list-style-type: none"><li>- Undeveloped urban land including unused arid lands and vacant enclosed lands</li><li>- Old barns or abandoned industrial areas within the urban zone</li></ul>
derelict lands	Brownfields Parts of the city that are crumbling and abandoned Dysfunctional, haunted, useless and polluted urban areas	<ul style="list-style-type: none"><li>- Areas of industrial and commercial recession and absence of basic functions and employment</li><li>- With abandoned and unused structures [9].</li><li>- Poverty and the deterioration of public facilities and equipment,</li><li>- With non-standard and outdated areas</li><li>- Areas with environmental pollution [3].</li><li>- Worn and vulnerable areas Against natural hazards</li><li>- Areas prone to crime and social problems</li></ul>
Grey field		

### 3.3. Brownfields definitions

A "Brownfield" is defined as abandoned, vacant, derelict, idled or underutilized property in the urban area with an active potential for redevelopment, where redevelopment is complicated by environmental contamination. The problem of environmental contamination may be further exacerbated by building deterioration/obsolescence, and/or inadequate infrastructure [9].

Brownfields are a valuable community resource that through redevelopment and reuse could easily bring important benefits to many economically depressed communities.

Brownfields is a relatively new term. Its definition according to CABERNET report [10] is the following "brownfields - sites that have been affected by the former uses of the site and surrounding land; are derelict and underused; may have real or perceived contamination problems; are mainly in developed urban areas; and require intervention to bring them back to beneficial use" [11].

The national definitions which have been explained are

not in contradiction with the Cabernet definition. The common characteristics of brownfields in all of these definitions are:

- abandoned
- Often but not always contaminated,
- require reclamation/revitalization
- Relict of industry, construction, agriculture, military or other anthropogenic activities.

In 2009 the term was defined for the first time by the Austrian Standards Institute in their standard ON S2093 , Survey and assessment of the environmental status of used surfaces for real estate evaluation , as follows: Brownfields (Brachfläche): previously used site or part of a site, which is presently derelict or underused. Owing to the site characteristics (e.g. dedication, status of its opening up for development, location) it offers a potential for reuse. The period, for which the site has been derelict, is not relevant [5].

In other countries, namely Slovakia, Italy and Poland, there are no legal definitions but the term "brownfields" enters the environmental language. In Slovakia such sites are understood as: "a site in an urbanized land which is not used effectively, abandoned probably contaminated it may

be used efficiently only after reclamation and revitalization. It is a relic of industrial, agricultural, building or other activities”.

Brownfields redevelopment and brownfields regeneration are both frequently used terms that are, in general, loosely defined and often used interchangeably [5].

Brownfields redevelopment is important in many ways: to preserve open space that would otherwise be gobbled up by urban sprawl; to reuse valuable existing infrastructure in city-planning projects; to revitalize stressed and depressed neighborhoods; to increase economic growth, employment opportunities, property values, and tax revenue; and to protect public health and the environment by reducing environmental threats.

Considering the issues raised, we can conclude that determining whether an area has the potential for redevelopment or not, is a combined result which is Attributable to the existence of different physical, environmental, social and economical factors. As a result, the abandonment of urban areas emerges due to various conditions which accelerate area's Deterioration in combination with each other. In areas that inefficiency is remarkable, there exists a set of social, economical and physical problems and it is not expected that the problems get less or the circumstances change, by government or private institutions' activities or both and without the need for the redevelopment plan.

New Jersey has consistently made brownfields redevelopment a priority, and has established numerous criteria and policies to promote the reuse of brownfields:

1. Maintain strong liability protection.
2. Create more flexible review procedures: Today, the review process for brownfields redevelopment projects is complicated, time-consuming, and expensive. Incorporating more flexibility into project reviews could help make the process more efficient and less expensive for both parties.
3. Take a risk-based approach to clean-up standards for non-residential sites.
4. Prioritize sites with economic development potential.
5. Replace funding from the Environmental Infrastructure Trust.

6. Increase the involvement of community leaders in brownfields redevelopment planning. Involving the community early on in a brownfields redevelopment project gives legitimacy to the project and can help avoid conflict later on. The state should explore providing technical assistance grants to community groups affected by brownfields projects.
7. Include green space in brownfields redevelopment. Many brownfields are located in urban areas and along waterways. Converting some of these sites into green space would provide recreational opportunities to urban residents as well as habitat for riparian species. Where possible, municipalities should work with redevelopers to convert some sites or portions of sites into publicly accessible green space [6].

Although in developing countries like Iran, the definition of abandoned lands is not necessarily homogeneous and identical to its definition in the west and in a more comprehensive view we can include the urban distressed areas which most cities in the country suffer from, within the abandoned lands, but also in large cities a lot of brownfields exist. Yet, unfortunately In Iran in addition to the fact that there is no specific definition of brownfields, there are no legislation and regulatory to determine the identity of these lands, and to know that these lands exist too. The only definition related to defining the abandoned lands, is the detention of arid lands which is mentioned in the Law on Land Reform act 1961.also no patterns and roadmap to redevelop brownfields in urban planning system of Iran exists.

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### 3.4. Benefits of Brownfields Redevelopment

Numerous Canadian and U.S. studies have highlighted the benefits of brownfields development at all geographic levels (national, regional, local). However, most of the benefits of brownfields development tend to accrue at the local level because all development, be it brownfields or greenfields, is inherently local. Therefore, the rationale for addressing the brownfields issue can be found in the significant economic, environmental and social benefits [10].

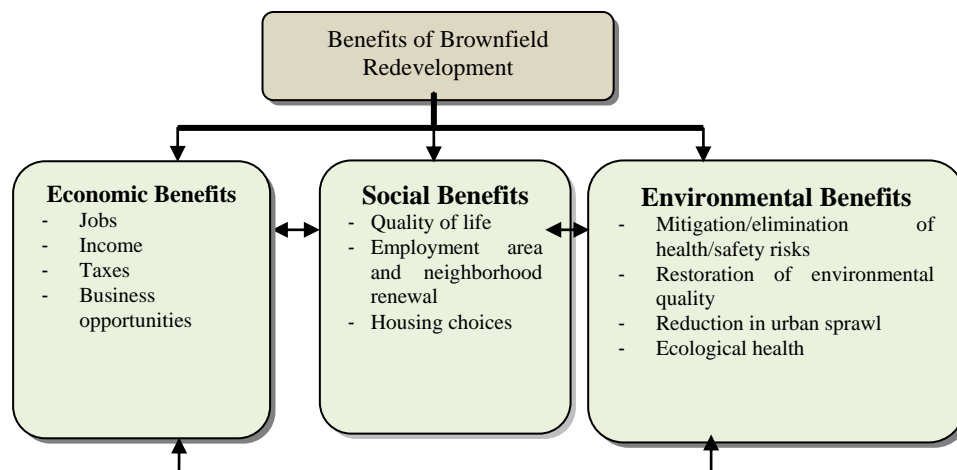


Fig. 1. Benefits of brownfields Redevelopment [10]

### 3.5. Brownfields roadmap

Decisions about the redevelopment option for a brownfields site are made at a number of stages during the process of brownfields redevelopment and by different stakeholders. To determine when these decisions are made, and what information is relevant to them, a roadmap of the brownfields redevelopment process was developed through a review of relevant literature which was supplemented, where necessary, by reviewing brownfields redevelopment case studies [13].

## 4. Results: The Roadmap of Redevelopment through Successful Experiences

Redeveloping brownfields is a complex multi-dimensional process that can tackle environmental, social and economic problems in industrial cities [14]. Failure to appreciate this complexity can delay or even prevent the return of sites to beneficial uses which in return can mean that the opportunity to regenerate urban areas is lost [15].

As the process will differ for each brownfields site the roadmap represents the key stages and activities of the process that are likely to be part of redeveloping any brownfields site. The roadmap was developed to provide an understanding, and representation, of where policy and information can influence the redevelopment of brownfields sites.

A roadmap should outline the stages, options and decision points of a process in order to provide a start to finish guide and can vary from simple descriptions to interactive computer programs. Roadmaps have been used in a wide range of fields and can be used to analyze processes that have already occurred or can guide a process [16].

There are at least four brownfields road maps within the literature:

- A. The brownfields Guide: A practitioner's guide to land reuse in England [17].
- B. Brownfields: managing the development of PDL: a client's guide [18].
- C. Roadmap of a holistic brownfields Regeneration project [15].
- D. And; Chart of the brownfields Redevelopment Process Flow.

English Partnerships' (2006a) and Laidler et al's (2002) roadmaps (Fig. 2) provide guidance for those managing

the development process (i.e. developers) in the UK. Laidler et al's roadmap represents the process of brownfields redevelopment (rather than brownfields regeneration) and focuses on the process of redeveloping land as a construction project, rather than as part of wider urban regeneration.

English Partnerships' roadmap places good point on the role of redevelopment in regeneration and is intended to provide guidance for public-sector, private sector or community-led redevelopment. English Partnerships' roadmap places significantly greater emphasis on the selection and assessment of redevelopment options than Laidler et al's roadmap but does not provide any specific tool or method to select the preferred brownfields redevelopment option.

The difference between the two roadmaps is explained, in part at least, by their purpose. Laidler et al's roadmap was published by the Construction Industry Research and Information Association (CIRIA) as guidance for land owners, developers, investors, Local Authority contaminated land and planning officers and environmental and engineering consultants.

English Partnerships' roadmap was developed as part a national brownfields strategy for England and is intended to provide guidance for a wider selection of stakeholders on effectively and sensitively reusing brownfields land.

In the United States a brownfields site is always considered to be affected by contamination and as such the USEPA Roadmap (Fig. 3) focuses on contaminated land management and is similar to the UK framework for the management of land contamination. This roadmap provides a guide to the process of managing a particular component of the redevelopment process and provides an example of the type of roadmap that will be incorporated within the roadmap developed in this research [19].

Although roadmaps exist, none provide a start to finish guide of the process that outlines the stages, options and decision points from the perspective of multiple stakeholders in sufficient detail to develop a list of brownfield characteristics and the mechanisms of brownfield redevelopment and regeneration.

The research presented here is intended to build upon existing roadmaps by considering the process from a wider perspective and incorporating more detail about the stages, components and decisions of brownfield redevelopment and then try to revised and adapted it to the situation of Iran.

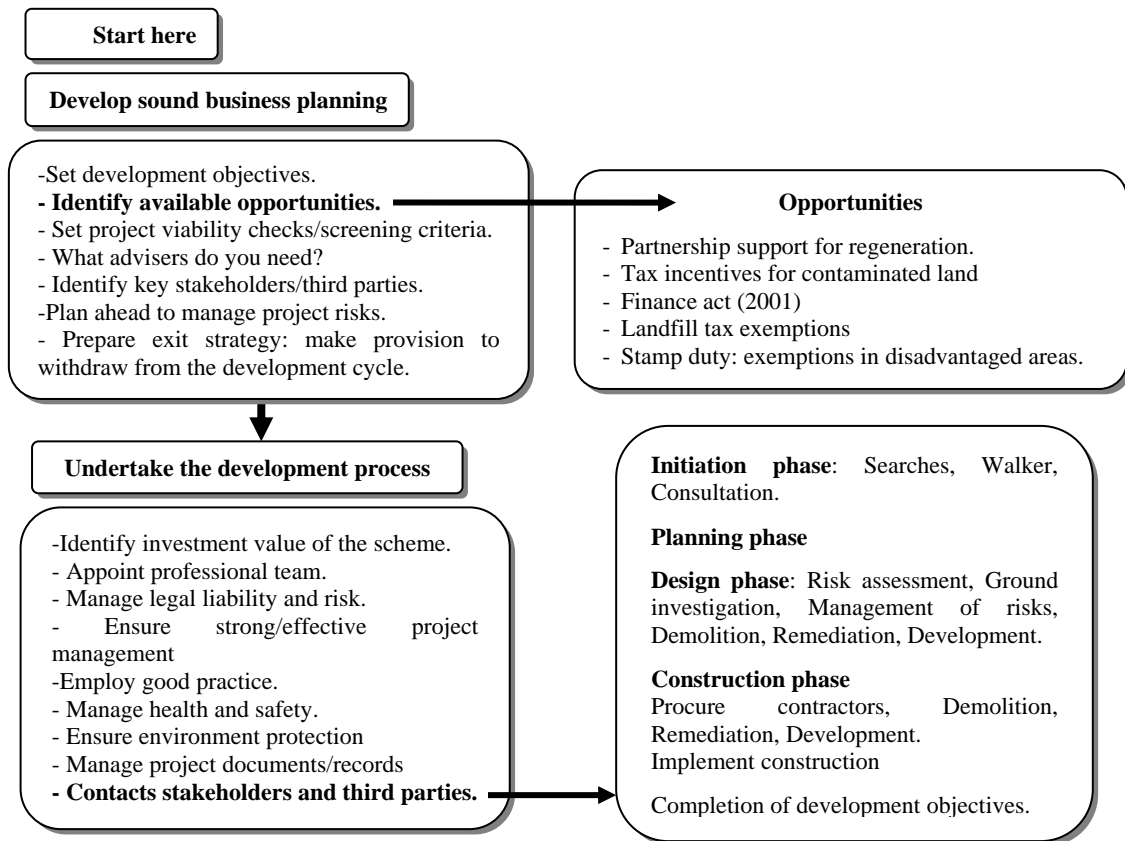


Fig. 2. Roadmap of the development of PDL (Adapted from Laidler et al., 2002)

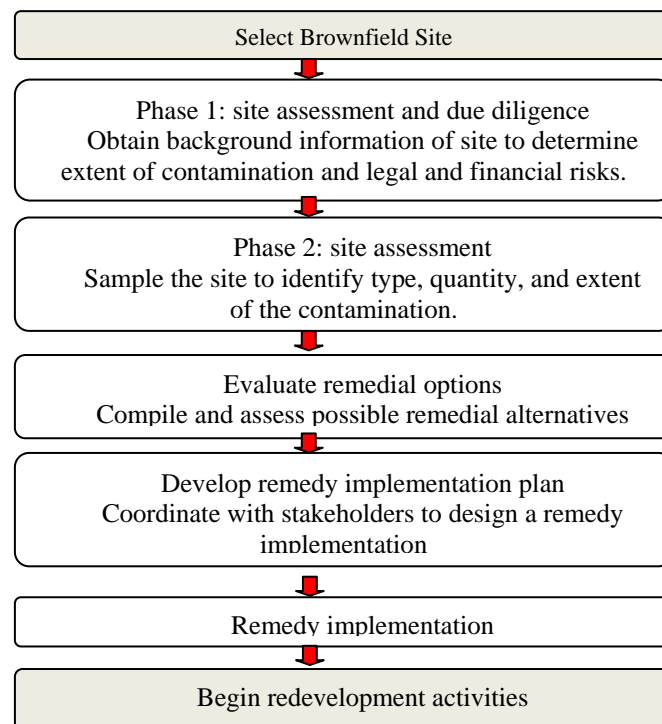


Fig. 3. US EPA Chart of the Brownfields Redevelopment Process Flow (Adapted from USEPA, 2001)

#### 4.1. The process of redeveloping brownfields sites

A large body of urban and property development literature exists including a number of texts which provide a broad overview of the development process for example

Harvey (2000), Cadman and Topping (1995) and Issac (1996). From these it is clear that development projects, including those on brownfields sites, have four main stages: 1. Initiation, 2. Characterization, planning and design; 3. Implementation; and 4. Completion.

Although the roadmap is presented in a generally linear form in reality the process is more iterative, as the process may return to earlier stages as further information is discovered or new conditions come to light [19].

#### A. Initiation stage of brownfields redevelopment

The first stage of the redevelopment process is initiation (Fig. 4). The process of redevelopment begins

when a stakeholder considers redeveloping a specific site. This decision may be taken for a number of reasons: a landowner may wish to sell their land to raise capital, a developer may require a site to develop, or a local authority or other public body may consider redevelopment will contribute to the achievement of its objectives as set out in the Local Development Framework.

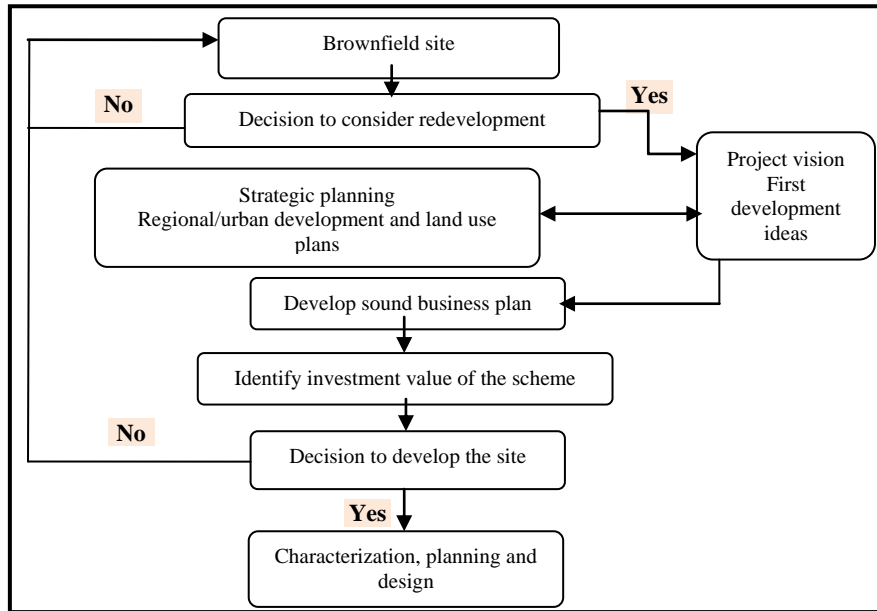


Fig. 4. Initiation stage of brownfields redevelopment [13]

#### B. The characterization, planning and design stage of brownfields redevelopment

The Characterization, planning and design stage (Fig. 5) involves establishing a scheme to meet the project objectives within the constraints of a particular site. To do this, site investigations will be undertaken to establish the site-conditions, identify the project's opportunities and identify any constraints on the redevelopment. These will inform the general planning of the redevelopment, including the selection of a redevelopment option, and the detailed design required to implement the proposed after use. Although the three components are represented as being sequential the process is generally quite iterative at this stage. Site investigations are carried out to determine what hazards may be present and what risks they present.

The transition from this stage to the next, implementation, takes place when work begins on the site. The boundary between this stage and the implementation stage is blurred as some aspects of the planning and design stage will continue after the implementation stage has begun but a significant milestone is planning permission as this must be received before the project can proceed.

#### C. The implementation stage of brownfields redevelopment

The implementation stage involves carrying out the work required to deliver the development as planned in the previous stage. The nature of the work carried out will depend upon the state of the site and the proposed after use but will usually include demolition, remediation, geotechnical work, construction, landscaping, works to mitigate potential risks such as flooding, and the installation of roads and other infrastructure. The implementation stage is complete once the construction objectives have been achieved and the site is ready for its after use.

#### D. The completion stage of brownfields redevelopment

The final stage of redevelopment is the completion stage. During this stage the completed development is transferred to the end user. This may be through the sale of the development directly to an end-user, the sale of the development to a third party who will manage the property, or the lease of the development to an end user. The type of transfer that takes place will depend on the individual project and should have been planned from the early stages of the development process.



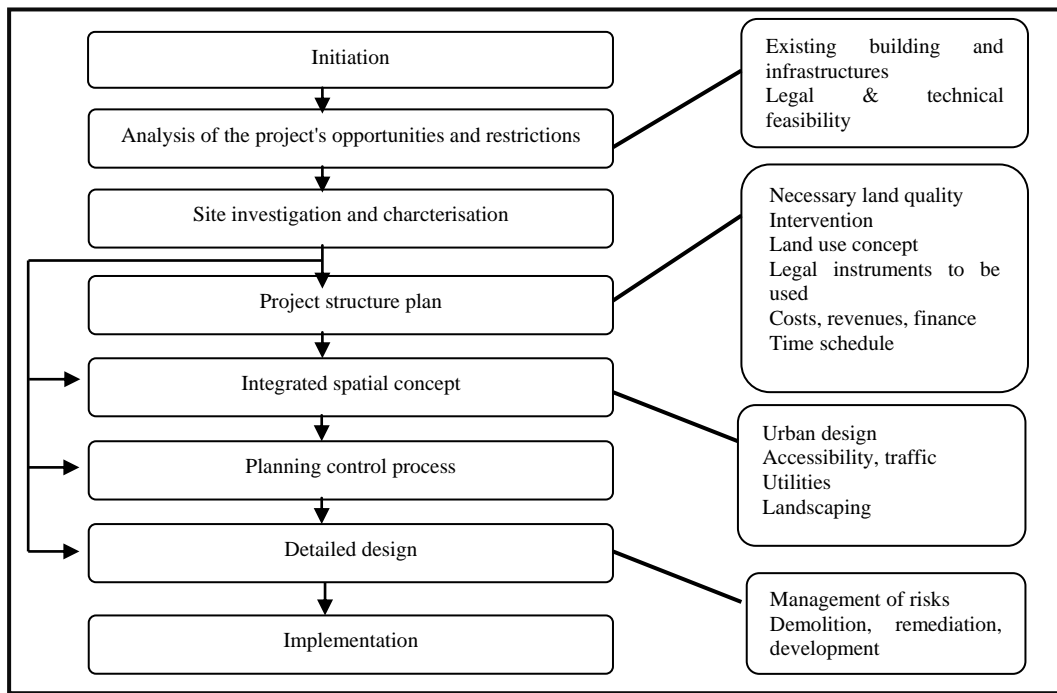


Fig. 5. Characterization, Planning and Design stage of brownfields redevelopment [13]

## 5. Discussion

### 5.1. Study of brownfields in Iran

Iran has also not been safe from the harms of the industrial revolution and its effects on the urban system. Along with the industrialization of cities and establishment of large industrial plants, the rural population came into cities in search for jobs, and gradually in different periods, the rural population increased. In Iran, the total Size of urbanization started to increase. Social and economical changes in the last half century caused an increase from 30% in the 1330s to about 80% in the early 1390s in urbanization. Social and economical changes caused deep alternations in urbanity and also major changes in the structure and performance of the cities, which all required Extensive physical changes. In fact these transformations led the Texture instability to arise as Physical exhaustion and economic and social damping.

Moreover in the periods before the Islamic revolution Concurrent with the Urban population growth, horizontal and scattered growth of the cities started and gradually the cities became bigger and bigger. Concurrent with the horizontal growth of the cities, Massive factories which once were in the margins, turned into large-scale areas inside the urban texture. These large-scale areas with uses incompatible with residence penetrated into the cities central textures. This trend continued until after the revolution in the late 1990s, policies like Protection and

preservation of the metropolitan area, encouragement of the urban infill development, the potential for inner development, more than ever were placed in the agenda of urban development plans and urban management.

Concurrent with the adoption of policies that transform the industrial use and actions disturbing the urban location, these large-scale lands did not stay in the cities like abandoned areas. There are numerous examples of these abandoned lands in different cities especially Metropolises. They are inefficient textures themselves and suffer from lack of efficiency and performance and of course have negative environmental, social and economical and even physical effects which require intervention and redevelopment. But still despite all of these issues, although there are many urban unused lands such as Brownfields, Commercial areas and Abandoned Storages (grey fields) and areas with environmental pollution especially in metropolians like Tehran, Mashhad, Isfahan and etc. but unfortunately the government has only made decisions about the urban problematic textures like old textures and informal settlements. At this stage of the study, considering the concepts and definitions of brown lands in other countries that were introduced in previous sections, we discussed the general classification of these lands' indicators in Iran based on the most common parameters in each of the factors affecting the inefficiency of these lands in urban textures.



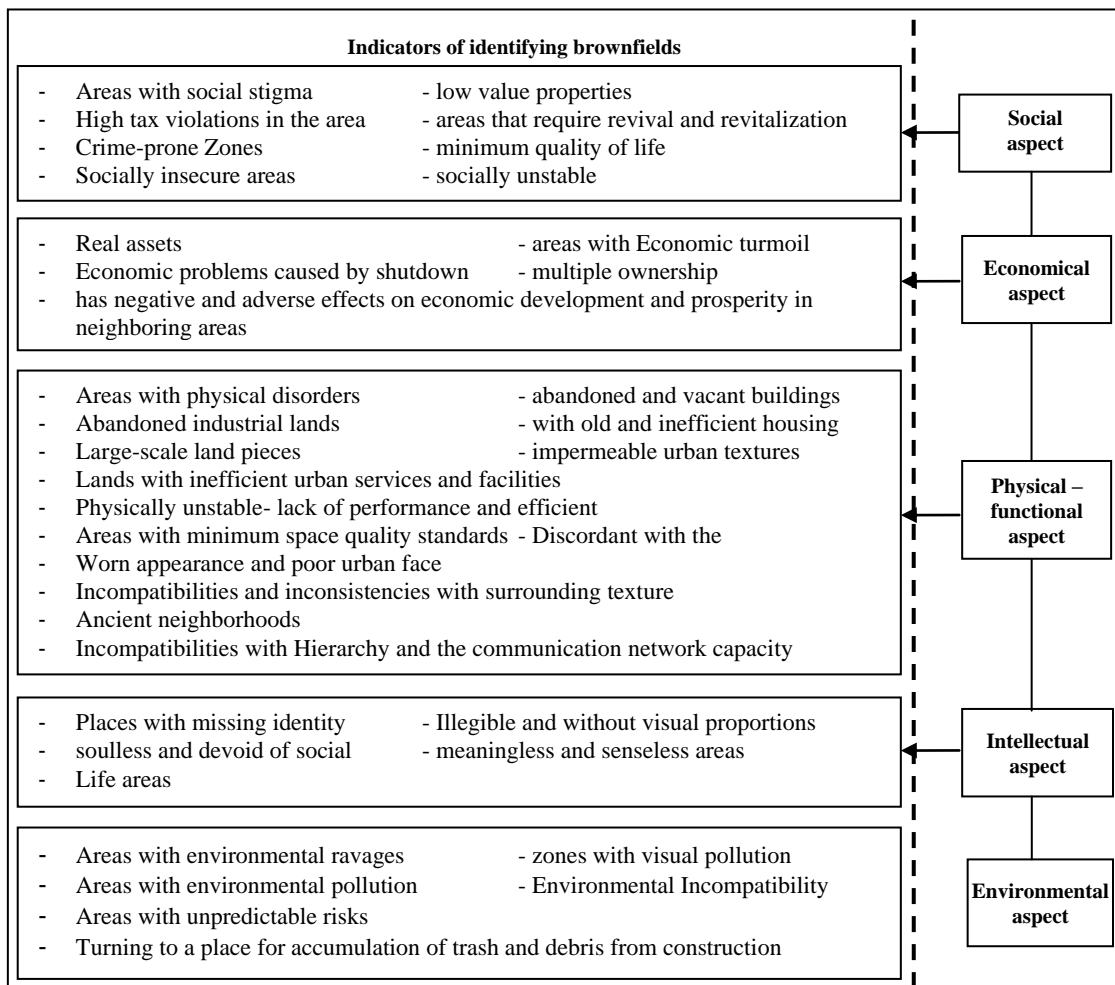


Fig. 6. indicators of identifying brownfields in Iran

## 6. Conclusion

Redevelopment is one of the views which centralizes it's planning and intervention basis on the existing environmental capacities within the texture and its potential and actual abilities. by placing the physic, the economy and the society of a dysfunctional texture along with each other, The redevelopment approach deals with the elimination of ineffective dimensions and falling behind from the appropriate development. According to the studies carried out, in this article we determined that redevelopment of the Brownfields, provides a lot of opportunities for the redevelopment of urban activities like employment, housing and urban areas that our cities need strongly. Despite all of these, Iran's urban planning faces the following problems and issues in redevelopment of the Brownfields:

- In the definitions presented in Iran, dysfunctional textures are introduced deteriorated area or informal settlements. And in all of the mentioned definitions, industrial abandoned lands (Brownfields) or even Abandoned Storage -Commercial lands (grey field) are neglected.
- Lack of efficient and suitable redevelopment legislation: studying the experiences of Brownfields redevelopment in developed countries like England,

the United States indicates that there is a legal basis supporting the intervention and development within the Brownfields. But unfortunately in Iran still the Brownfields do not have a legislative definition and consequently intervention and redevelopment of these lands is neither legal.

- Lack of a proper approach and a clear insight in this regard.
- Absence of a clear framework and theoretical foundation.
- Lack of an appropriate setting for the participation of the Community and investor and developer groups in the redevelopment of the Brownfields.
- Unpleasant experiences of Renovation of deteriorated area in Iran and public negative opinions towards the intervention in urban textures.
- Failure to accomplish or a very long course for the Implementation of the plans (management weaknesses in implementation).

Considering the Brownfields redevelopment roadmap in some of the developed countries and the indicators obtained to define the Brownfields in Iran and also given the urban management system and preparation of urban development plans, this article's suggested roadmap (Fig. 7) to redevelop the Brownfields in Iran which is appropriate with urban management and urban planning system of Iran.

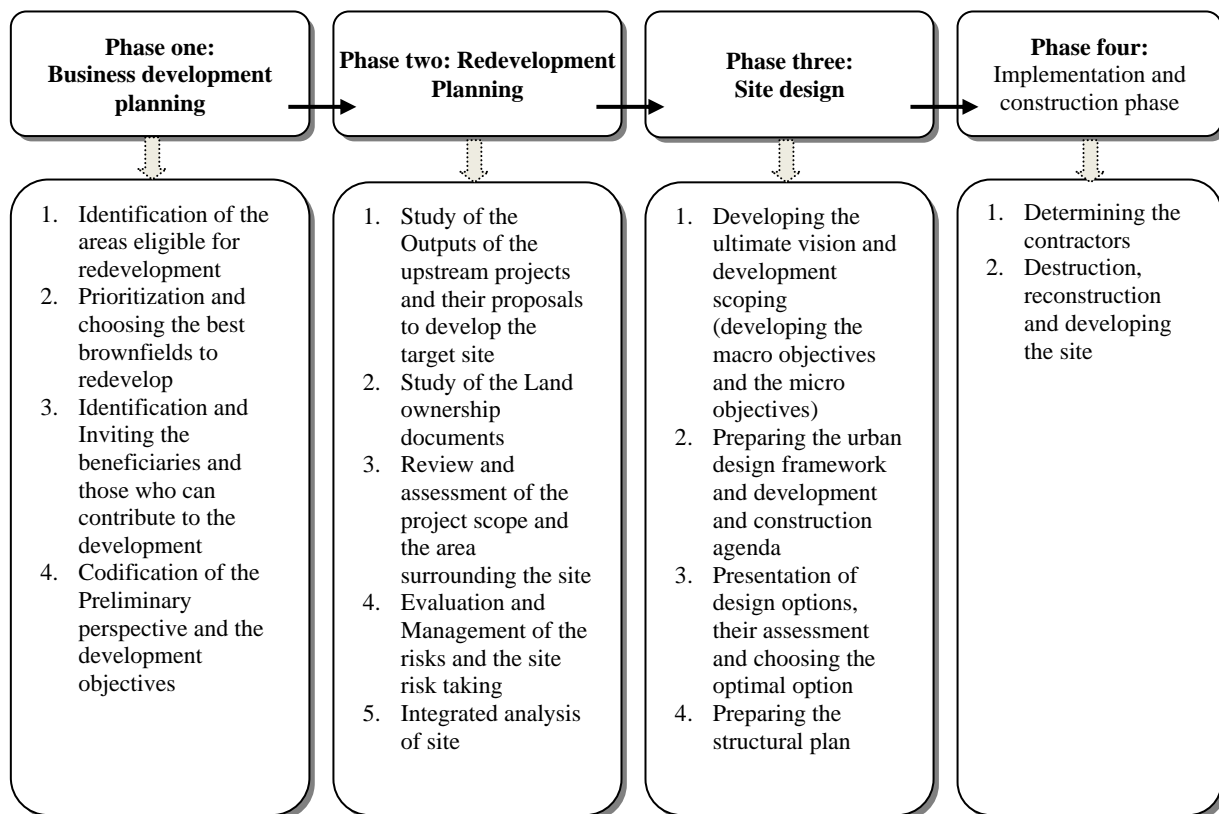


Fig. 7. Brownfield redevelopment roadmap proposed suitable for Iran

**Acknowledgment:** This paper is extracted from the second author's Ph.D. dissertation, entitled: "Brownfield Redevelopment with Smart Growth Approach" which is supervised by Dr. Seyed Majid Mofidi Shemirani and advised by dr. Alireza Andalib in the Science and Research Branch, Islamic Azad University, Tehran, Iran.

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